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FIG. 1. Cranberry Bog, Lakewood, New Jersey. *Vaccinium macrocarpon*. *Pinus rigida* in background. (8405)

BROOKLYN
BOTANIC GARDEN
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DELECTUS SEMINUM, BROOKLYN, 1932

List of Seeds Offered in Exchange

These seeds, collected during 1932, are offered to botanic gardens and to other regular correspondents; also, in limited quantities, to members of the Brooklyn Botanic Garden. They are not offered for sale.

Acknowledgment is made to the Arnold Arboretum and to Mr. Anton Hodenpyl (Locust Valley, Long Island) for the privilege of collecting seeds of a number of uncommon plants on their grounds. We are also indebted to Mrs. Clarence R. Hyde (Brooklyn) for collecting many seeds.

Applications for seeds must be received during January or February. Latest date **February 28, 1933.**

SEEDS OF TREES AND SHRUBS

Gymnospermae

Ginkgoaceae

Ginkgo
biloba L.

Taxaceae

Dacrydium
†cupressinum Soland.

Phyllocladus
†trichomanoides D. Don

Podocarpus
†dacrydioides A. Rich
†ferrugineus D. Don
†Totara D. Don

Taxus
*canadensis Marsh.

† New Zealand coniferous seeds, obtained by courtesy of the State Forest Service, Wellington, New Zealand.

* Seeds collected from wild plants.

Cupressaceae

Juniperus
communis L. var. depressa Pursh

Pinaceae

Agathis
†australis Salisb.
Cedrus
libanotica Link

DICOTYLEDONES

Aceraceae 163

Acer
ginnala Maxim.
rubrum L.

Anacardiaceae 153

Rhus
*canadensis Marsh.
*copallina L.
*glabra L.
sylvestris Sieb. & Zucc.
*typhina L.

Aquifoliaceae 157

Ilex
crenata Thunb.
glabra Gray
*laevigata (Pursh) Gray
*opaca Ait.
serrata Thunb.
*verticillata (L.) Gray
Nemopanthus
*mucronata Trel.

Araliaceae 227

Acanthopanax
Henryi Harms
leucorrhizus Harms var. scaberulus Harms & Rehd.
senticosus Harms
sessiliflorus Seem.
setchuenensis Harms
Simoni Schneid.

Berberidaceae 93

Berberis
chinensis Poir.
Dielsiana Fedde
Henryana Schneid.
koreana Palib.
notabilis Schneid.
Thunbergii DC.
Thunbergii var. minor Rehd.
Mahonia
Aquifolium Nutt.

Betulaceae 61

Alnus
incana Moench
Betula
Ermani Cham.
*lutea Michx.
pubescens Ehrh.
Carpinus
betulus L. var. quercifolia Desf.
*caroliniana Walt.
Corylus
*cornuta Marsh. (C. rostrata Ait.)

Calycanthaceae 96

Calycanthus
fertilis Walt.
fertilis var. nanus Schelle

Caprifoliaceae 271

Kolkwitzia
amabilis Graebn.
Lonicera
alpigena L.
*canadensis Marsh. (few)
chrysantha Turcz. (few)
Ferdinandi Franch.

Ferdinandi var. induta Rehd.
Henryi Hemsl.
iberica Bieb.
Maackii Maxim.
× muscaviensis Rehd.
quinquelocularis Hardw.
syringantha Maxim. (few)
tatarica L.
Webbiana Wall.
Sambucus
*canadensis L.
Symphoricarpus
albus (L.) Blake (S. racemosus Michx.)
× Chenaultii Rehd.
occidentalis Hook.
*orbiculatus Moench
Viburnum
*acerifolium L.
*alnifolium Marsh.
*cassinoides L.
dilatatum Thunb.
dilatatum var. xanthocarpum Rehd.
erosum Thunb.
hupehense Rehd.
Lantana L.
Lentago L.
lobophyllum Graebn.
Opulus L.
*prunifolium L.
pubescens Pursh var. Canbyi Blake
rufidulum Raf.
theiferum Rehd.
theiferum Rehd. (orange fruit)
Wrightii Miq.

Celastraceae 158

Celastrus
orbiculata Thunb. (C. articulata Thunb.)
*scandens L.
Evonymus
*americana L.
*atropurpurea Jacq.
Bungeana Maxim.
europaea L.
latifolia Scop.
patens Rehd.

Clethraceae 230

Clethra
*alnifolia L.

Coriariaceae 150

Coriaria
japonica Gray

Cornaceae 229

Cornus
alba L.
*alternifolia L.
*Amomum Mill.
*canadensis L.
*florida L.
florida var. rubra West.
florida var. xanthocarpa Rehd.
kousa Buerg.
sanguinea L.
*stolonifera Michx.
stolonifera var. flaviramea Rehd.

Ebenaceae 240

Diospyros
*virginiana L.

Elaeagnaceae 215

Elaeagnus
angustifolia L.
multiflora Thunb. (E. longipes Gray)
umbellata Thunb.
Hippophae
rhamnoides L.

Ericaceae 233

Epigaea
*repens L.
Oxydendrum
arboreum DC.
Pieris
japonica D. Don
Kalmia
latifolia L.
polifolia Wangenh.
Gaultheria
*procumbens L.
Lyonia
*ligustrina (L.) DC.
*mariana (L.) D. Don
Rhododendron
*viscosum Torr.
Zenobia
pulverulenta Pollard

Ericaceae

—Vaccinoideae 233a

Gaylussacia
*baccata K. Koch
*dumosa Torr. & Gr.
*frondosa Torr. & Gr.
Vaccinium
*pennsylvanicum Lam.
*pennsylvanicum var. nigrum Wood
*vacillans Soland.

Flacourtiaceae 199

Idesia
polycarpa Maxim.

Guttiferae 187

Hypericum
aureum Bartr.
Buckleyi M. A. Curtis
densiflorum Pursh
patulum Thunb. var. Henryi Veitch
prolificum L.

Hamamelidaceae 123

Fothergilla
major Lodd.
monticola Ashe
Hamamelis
*virginiana L.
Liquidambar
*Styraciflua L.

Juglandaceae 60

Carya
*alba K. Koch
*ovata K. Koch
Juglans
*cinerea L.
*nigra L.
Platycarya
strobilacea Sieb. & Zucc.
Pterocarya
× Rehderiana Schneid.

Lardizabalaceae 92

Akebia
quinata × trifoliata

Lauraceae 102

Benzoin
*aestivale Nees
Sassafras
*officinale Nees & Eberm.

Leguminosae

—Caesalpinoideae 127b

Gleditsia
triacanthos L.
Gymnocladus
dioica K. Koch

Leguminosae

—Papilionatae 128

Amorpha
glabra Poir.
Campylotropis
macrocarpa Rehd.
Caragana
arborescens Lam.

Cercis
chinensis Bge.
Colutea
arborescens L.
cilicica Boiss.
istria Mill.
Coronilla
Emerus L.
Cytisus
hirsutus L.
multiflorus Sweet
nigricans L.
× praecox Bean
scoparius Lk.
scoparius var. pendulus Nichols
Genista
hispanica L. (few)
pilosa L.
sagittalis L. (few)
Laburnum
alpinum Bercht. & Presl
anagyroides Med.
Lespedeza
formosa Koehne
Robinia
fertilis Ashe
× Holdtii Beissn.
Kelseyi Hutchins.
pseudoacacia L. var. Decaisneana Carr.
Sophora
japonica L.
viciifolia Hance

Lythraceae 216

Lagerstroemia
indica L.

Magnoliaceae 95

Liriodendron
*Tulipifera L.

Menispermaceae 94

Menispermum
*canadense L.

Moraceae 64

Broussonetia
papyrifera Vent.
Maclura
pomifera Schneid.
Morus
alba L. var. tatarica Loud.
acidosa Griff.

Myricaceae 57

Myrica
*carolinensis Mill.

Nyssaceae 220a

Nyssa
*sylvatica Marsh.

Oleaceae 243

Chionanthus
virginica L.
Fontanesia
Fortunei Carr.
Fraxinus
*americana L.
longicuspis Sieb. & Zucc.
Ornus L.
*pennsylvanica Marsh.
Ligustrum
acuminatum Koehne var. macrocarpum Schneid.
vulgare L. var. lodense Hort.

Polygonaceae 77

Polygonum
Aubertii L.

Pyrolaceae 231

Chimaphila
*umbellata Nutt.

Ranunculaceae 91

Clematis
integrifolia L.
*virginiana L.

Rhamnaceae 169

Rhamnus
cathartica L.
davurica Pall.
Frangula L.

Rosaceae 126

Exochorda
Giraldii Hesse var.
Wilsonii Rehd.
Physocarpus
bracteatus Rehd.
intermedius Schneid.
intermedius var. parvifolius Rehd.
opulifolius Maxim.
stellatus Rehd.
Potentilla
*fruticosa L.
tridentata Soland.
Rhodotypos
kerrioides Sieb. & Zucc.
Rosa
× alba L.
*virginiana Mill.
Sorbaria
Aitchisonii Hemsl.
arborea Schneid var.
glabrata Rehd.
Lindleyana Maxim.
Spiraea
× Billiardii Herincq
Blumei G. Don
*latifolia Borkh.
Menziesii Dougl.
*tomentosa L.

Rosaceae

—Pomoideae 126a

Amelanchier
*laevis Wieg.
Aronia
arbutifolia L.
arbutifolia var. atropurpurea (Brit.) Rob.
floribunda Spach
melanocarpa (Michx.) Willd.
melanocarpa var. elata Rehd.
Cotoneaster
ambigua Rehd. & Wils.
apiculata Rehd. & Wils.
lucida Schlecht.
microphylla Wall.
nitens Rehd. & Wils.
racemiflora K. Koch var.
songarica Schneid.
Crataegus
durobrivensis Sarg.
phaenopyrum Med.
Sorbus
americana Marsh.

Rosaceae

—Prunoideae 126b

Prunus
*pennsylvanica L.
*serotina Ehrh.
tomentosa Thunb.
*virginiana L.
virginiana var. melanocarpa Sarg.

Rubiaceae 270

Cephalanthus
occidentalis L.

Rutaceae 137

Evodia
Daniellii Hemsl.
hupehensis Dode
Phellodendron
amurense Rupr.
chinense Schneid.
Poncirus
trifoliata Raf.
Ptelea
crenulata Greene
isophylla Greene
serrata Small

Zanthoxylum
Bungei Planch.
simulans Hance

Salicaceae 56

Salix
*Bebbiana Sarg.
*sericea Marsh.

Sapindaceae 165

Koelreuteria
paniculata Laxm.

Saxifragaceae 117

Hydrangea
arborescens L.
Itea
virginica L.
Ribes
aureum Pursh
fasciculatum Sieb. & Zucc. var. chinense Maxim.
*lacustre Poir.
odoratum Wendl. (few)
*triste Pall. var. albinervium Fern.

Solanaceae 256

Lycium
chinense Mill.

Staphyleaceae 161

Staphylea
bumalda DC.
colchica Stev. var. Coulombieri Zabel
pinnata L.
*trifolia L.

Styracaceae 242

Halesia
carolina L.
Pterostyrax
hispida Sieb. & Zucc.
Styrax
japonica Sieb. & Zucc.

Symplocaceae 241

Symplocos
paniculata Wall.

Tamaricaceae 191

Tamarix
odessana Stev.
parviflora DC.
pentandra Pall.

Tiliaceae 174

Grewia
parviflora Bge.

Ulmaceae 63

Celtis
Douglasii Planch.
occidentalis L.
Ulmus
*americana L.
fulva Michx.
*racemosa Thomas

Verbenaceae 253

Callicarpa
dichotoma Raeusch
Giraldiana Hesse
japonica Thunb.
Clerodendron
trichotomum Thunb.
Vitex
agnus-castus L.
agnus-castus var. macrophylla Hort.
Negundo L. var. incisa Clarke

Vitaceae 170

Ampelopsis
brevipedunculata Koehne var. Maximowiczii Rehd.
Parthenocissus
*quinquefolia Planch.
Vitis
*labrusca L.
*vulpina L.

MONOCOTYLEDONES

Liliaceae 338

Smilax
*glauca Walt.
*laurifolia L.
*rotundifolia L.
*Walteri Pursh
Yucca
filamentosa L.

SEEDS OF HERBACEOUS PLANTS

DICOTYLEDONES

Acanthaceae 266

Ruellia
ciliosa Pursh

Amarantaceae 79

Celosia
argentea L. var. plumosa Hort.
Gomphrena
globosa L. var. alba Hort.
Haageana Klotzsch
Telanthera
polygonoides Moq.

Araliaceae 227

Aralia
*hispida Vent.
*racemosa L.

Asclepiadaceae 248

Acerates
*viridiflora Ell.
Asclepias
*incarnata L.
*phytolaccoides Pursh
speciosa Torr.
*syriaca L.
*tuberosa L.

Balsaminaceae 168

Impatiens
*biflora Walt.

Berberidaceae 93

Caulophyllum
*thalictroides Michx.

Capparidaceae 107

Polanisia
*graveolens Raf.

Caprifoliaceae 271

Linnaea
*borealis L. var americana (Forbes) Rehder

Caryophyllaceae 87

Cerastium
Biebersteinii DC.
Dianthus
sylvestris Wulf.
Gypsophila
repens L.
Lychnis
Flos-Jovis Desr.
Haageana Lem.
Saponaria
caespitosa DC.
lutea L.
Silene
alpestris Jacq.
apetala Willd. var. orientalis Boiss.
Schafta Gmel.
Zawadskii Herbich
Tunica
Saxifraga Scop.
Viscaria
vulgaris Roehl.

Cichoriaceae 281

Crepis
rubra L.

Hieracium
umbellatum L.

Cistaceae 193

Lechea
*villosa Ell.

Compositae 280

Anaphalis
*margaritacea Benth. & Hook.
Antennaria
*neglecta Greene
*plantaginifolia Rich.
Arctotis
stoechadifolia Berger
Aster
*acuminatus Michx.
*concolor L.
*dumosus L.
*gracilis Nutt.
*linariifolius L.
*novi-belgii L.
*patens Ait.
*puniceus L.
*spectabilis Ait.
Bidens
*coronata (L.) Fisch.
*laevis (L.) BSP.
Centaurea
americana Nutt.
macrocephala Puschk
Chrysopsis
*mariana Nutt.
Coreopsis
grandiflora Nutt.
rosea Nutt.
Eupatorium
*perfoliatum L.
*sessilifolium L.
*urticaefolium Reich.
Felicia
Bergeriana Hoffm.
Gaillardia
aristata Pursh
Helenium
*autumnale L.
Helianthus
*angustifolius L.
Liatris
pycnostachya Michx.
Onopordon
Acanthium L.
Sanvitalia
procumbens Lam.
Senecio
Biebersteinii Grecescu
Sericocarpus
*asteroides (L.) BSP.
*linifolius (L.) BSP.
Solidago
*bicolor L.
*caesia L.
Cutleri Fernald
*Elliottii T. & G.
glomerata Michx.
*patula Muhl.
*stricta Ait.
Ursinia
anthemoides Gaertn.
Venidium
decurrens Less.
Vernonia
*noveboracensis Willd.

Cruciferae 105

Iberis
sempervirens L.

Cucurbitaceae 275

Echinocystis
*lobata (Michx.) T. & G.
Sicyos
*angulatus L.

Droseraceae 112

Drosera
*longifolia L.

Guttiferae 187

Hypericum
*adpressum Bart.
*Ascyron L.

*canadense L.
*mutilum L.
*virginicum L.

Labiatae 254

Stachys
*hyssopifolia Michx.

Leguminosae 128

Apios
*tuberosa Moench
Lathyrus
latifolius L.
Strophostyles
*helvola (L.) Britt.

Lentibulariaceae 264

Utricularia
*cornuta Michx.

Lobeliaceae 276a

Lobelia
*cardinalis L.
tenuior R. Br.

Melastomaceae 223

Rhexia
*virginica L.

Onagraceae 224

Epilobium
*coloratum Muhl.
Oenothera
*pumila L.

Papaveraceae 104

Eschscholtzia
californica Cham.

Parnassiaceae 116a

Parnassia
*caroliniana Michx.

Phytolaccaceae 83

Phytolacca
*americana L.

Plumbaginaceae 238

Armeria
juncea Girard
Limonium
Suworowii Kuntze

Polygonaceae 77

Eriogonum
umbellatum Torr.

Portulacaceae 85

Claytonia
*virginica L.

Primulaceae 237

Dodecatheon
Meadia L.
Lysimachia
*terrestris (L.) BSP.
Primula
japonica Gray
Steironema
*ciliatum (L.) Raf.
*lanceolatum (Walt.)
Gray
Trientalis
*americana (Pers.) Pursh

Pyrolaceae 231

Monotropa
*uniflora L.

Ranunculaceae 91

Actaea
*alba (L.) Mill.
Anemone
*quinquefolia L.
Anemonella
*thalictroides (L.) Spach
Aquilegia
*canadensis L.
Caltha
*palustris L.

Coptis
*groenlandica (Oeder) Fernald (C. trifolia of auth.)
Hepatica
*triloba Chaix.
Ranunculus
*hispidus Michx.
*recurvatus Poir.
Thalictrum
*polygamum Muhl.
Trollius
*laxus Salisb.

Rosaceae 126

Potentilla
*pumila Poir.

Rubiaceae 270

Asperula
cynanchica L.
Mitchella
*repens L.

Scrophulariaceae 257

Chelone
*glabra L.
Gerardia
*tenuifolia Vahl
Gratiola
*aurea Muhl.
Linaria
*canadensis (L.) Dumont
Mimulus
*ringens L.
Pedicularis
*canadensis L.
Pentstemon
hirsutus (L.) Willd. var. pygmaeus

Solanaceae 256

Nicotiana
sylvestris Spegaz.

Urticaceae 65

Boehmeria
*cylindrica (L.) Sw.

Violaceae 198

Viola
*conspersa Reichenb.
*pubescens Ait.

MONOCOTYLEDONES

Amaryllidaceae 340

Alstroemeria
aurantiaca D. Don var. lutea Hort.

Araceae 323

Arisaema
*triphyllum (L.) Schott
Peltandra
*virginica (L.) Kunth

Cyperaceae 320

Cyperus
*erythrorhizos Muhl.
Hemicarpha
micrantha (Vahl) Britt.

Eriocaulaceae 330

Eriocaulon
*septangulare With.

Gramineae 319

Andropogon
*glomeratus (Walt.) BSP.
Amphicarpon
*Purshii Kunth

Iridaceae 344

Belamcanda
chinensis (L.) DC.
Iris
dichotoma Pall.

Juncaceae 336

Juncus
*militaris Bigel.

Liliaceae 338

Aletris
*farinosa L.
Clintonia
*borealis (Ait.) Raf.
Helonias
*bullata L.
Lilium
*canadense L.
*superbum L.
Maianthemum
*canadense Desf.
Medeola
*virginiana L.
Polygonatum
*biflorum (Walt.) Ell.
Trillium
*erectum L.
*undulatum Willd.
Uvularia
*perfoliata L.
Veratrum
*viride Ait.

Orchidaceae 350

Cypripedium
*acaule Ait.
Pogonia
*ophioglossoides (L.) Ker

Pontederiaceae 334

Pontederia
*cordata L.

Sparganiaceae 310

Sparganium
*eurycarpum Engelm.

Xyridaceae 329

Xyris
*Congdoni Small

Seeds Collected in Southern and Western United States—Fall of 1931

By A. J. Sharp

Agave
virginica L.
Aster
paludosus Ait.
Chelone
Lyoni Pursh
Cimicifuga
racemosa (L.) Nutt.
Cladrastis
lutea (Michx. f.) Koch
Conopholis
americana (L. f.) Wallr.
Cuphea
petiolata Koehne
Diervilla
sessilifolia Buckl.
Eclipta
alba Hassk.
Hibiscus
militaris Cav.
Hydrangea
cinerea Small
Leucothoe
Catesbaei (Walt.) Gray
Opulaster
intermedius Rydb.
Opuntia
polyacantha Haw.
Passiflora
incarnata L.
lutea L.
Psoralea
tenuiflora Pursh
Sagittaria
graminea Michx.

Smilax
herbacea L.
Smilacina
racemosa (L.) Desf.
Solidago
glomerata Michx.
Strophostyles
angulosa Ell.

Seeds Collected in Tennessee

By C. P. Freeman

Leavenworthia
sp.
stylosa A. Gray

Address requests for seeds to

SEED EXCHANGE,
Brooklyn Botanic Garden,
1000 Washington Avenue,
Brooklyn, N. Y.,
U. S. A.

NOTES TO ACCOMPANY THE SEED LIST—1932 [1]

This Seed List has been issued with the two-fold purpose of supplying seeds to American and foreign botanic gardens under the International Seed Exchange and to Garden members. Therefore the annual list of collected seeds has appeared as a number of the RECORD of the Brooklyn Botanic Garden. Since even the dictionary provides better reading than these lists, we have prepared a short account of the seed exchange and of seed collection to accompany the enumeration.

Nearly two hundred botanic gardens located in all parts of the world publish lists of seeds obtained by them either from plants grown in their gardens or from wild plants. In our own Garden these seeds have played an important part in supplying the plants which may be observed in the conservatories and on the grounds. It should seem possible to obtain by this medium of exchange almost any species of plant desired.

But there are innumerable difficulties to be encountered in the collection and transportation of seeds. Even in temperate regions it is disappointing to visit a place where flowers of the desired species were abundant, to find seeds meagerly developed or none at all. In the tropics the task is much harder. As Fairchild has remarked in his readable book "Exploring for Plants," "to get seeds [of the mangosteen] when they are in just the right condition means months of waiting and repeated expeditions, for the jungle folks are watching the trees too, and they often gather the fruits and scatter the seeds, so that when the collector returns to the tree he has marked, it is only to find it bare of fruits and he must wait another year for the next crop. Not one in a million of them [the natives] would lift a finger to get you the seeds even though he did know where to find them. . . . If he should happen to collect the seeds the chances are he would not know how to pack them so they would reach America alive."

Then there are the difficulties in accurately naming the seeds

[1] Primarily for members of the Brooklyn Botanic Garden.

collected, especially of cultivated forms. The exact origin of many cultivated plants is unknown, for example the Jimson weeds (*Datura Stramonium* and *D. Tatula*), *Petunia,* Indian corn (*Zea Mays*). Cultivation has resulted in a further increase of troubles. To give accurate names in such difficult groups as *Dianthus, Allium, Sedum, Saxifraga* and *Artemisia* is a lifetime of work in itself. It is little wonder that seed collections often have errors in determination.

Comparatively little is known about the optimum conditions for germination of seeds of native plants; it is only in the last few years that intensive work has been done. Some seeds require freezing before they will germinate, others need a heat treatment. Some take two years to germinate, others still longer. The Japanese botanist, Dr. Ohga, has reported that seeds of the lotus (*Nelumbo nucifera*), known to be at least two hundred years old could still be germinated.

Some seeds, for example species of *Magnolia,* will not germinate if they are dried; others will not germinate unless they are allowed to dry. The Indian rice (*Zizania aquatica*) must be kept under water in order to survive. Some seeds sprout almost immediately after ripening, such as the golden club (*Orontium*). A visit to collect the seeds of *Orontium* will result in finding sprouting plants instead. Some seeds such as those of the orchids ordinarily require the presence of fungi for germination, although in recent years complicated methods of growth in nutrient solutions without fungi have been devised by Dr. Knudson, of Cornell University. Citations of peculiarities in seed germination could be extended almost indefinitely.

In order to avoid duplication the Brooklyn Botanic Garden has recently confined itself to the collection of seeds of woody plants in one year and of herbaceous plants in the succeeding year, except for such specialties as may seem desirable. Since seeds of native plants have been most in demand, their collection has been less restricted than in the case of cultivated species. The area of pine-barrens extending from Cape Cod to New Jersey and southward still offers an abundance of material rarely or never seen in cultivation. Of unusual interest from the pine-barrens in our list for this year are the seeds of cat-briers (the red-berried *Smilax*

Walteri and the evergreen *S. laurifolia*), the bog huckleberry (*Gaylussacia dumosa*), pine-barren asters (*A. gracilis* and *A. spectabilis*), and the peculiar goldenrod, *Solidago stricta.* Most of the seeds representing the Canadian and Appalachian floras have been collected in the Catskill Mountains, New York, at an evelation of 2000–3500 ft. (600–1000 meters). Such are the bunchberry (*Cornus canadensis*), the gooseberries (*Ribes lacustre* and *R. triste*), and the mountain holly (*Nemopanthus mucronata*).—H. K. S.

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GENERAL INFORMATION

Membership.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, N. Y.* Telephone, Prospect 9-6173.

The Botanic Garden is open free to the public daily from 8 a.m. until dusk; on Sundays and Holidays it is open at 10 a.m.

Entrances.—On Flatbush Avenue, near Empire Boulevard and near Mt. Prospect Reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Crown Street.

To Assist Members and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one day in advance. No parties of less than six adults will be conducted.

To Reach the Garden take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, or Tompkins Avenue trolleys to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street or Vanderbilt Avenue trolleys to Prospect Park Plaza and Union Street. By Automobile from points on Long Island take Eastern Parkway west and turn left at Washington Avenue; from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway, turn left following Parkway to Washington Avenue; then turn right.

BROOKLYN BOTANIC GARDEN
PUBLICATIONS

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly beginning with 1929. Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, announcements of courses of instruction, seed list, guides, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others $1.50 a year. Circulates in 59 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Circulates in 47 countries.

Volume I. *Dedication Papers:* comprising 33 scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. 521 pages. Price $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. Price $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor, June 10, 1927. 151 pages. Price $1.60.

CONTRIBUTIONS. Established, April 1, 1911. Papers originally published in periodicals, reissued as "separates," without change of paging, and numbered consecutively. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume. Circulates in 34 countries.

63. Inheritance of resistance to loose and covered smut in a hybrid of Early Gothland and Victor oats. 10 pages. 1932.

64. Inheritance of resistance to loose and covered smut in hybrids of Hull-less with Early Gothland and Monarch oats. 28 pages. 1932.

65. Monographic studies in the genus Eleocharis—II. 34 pages. 1932.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the RECORD; see above.

Guide No. 6. Japanese potted trees (*Hachinoki*). 11 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 7. The story of our boulders: Glacial geology of the Brooklyn Botanic Garden. 22 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 8. The story of fossil plants. Guide to the transparencies in Conservatory House No. 2. 8 illustrations. Price, 35 cents. By mail, 40 cents.

SEED LIST. (*Delectus Seminum*) Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 160 botanic gardens and institutions located in 40 countries.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in coöperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription, $7.00 a year. Circulates in 53 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $4.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly. Subscription, $6.00 a year. Circulates in 37 countries.

BROOKLYN BOTANIC GARDEN RECORD

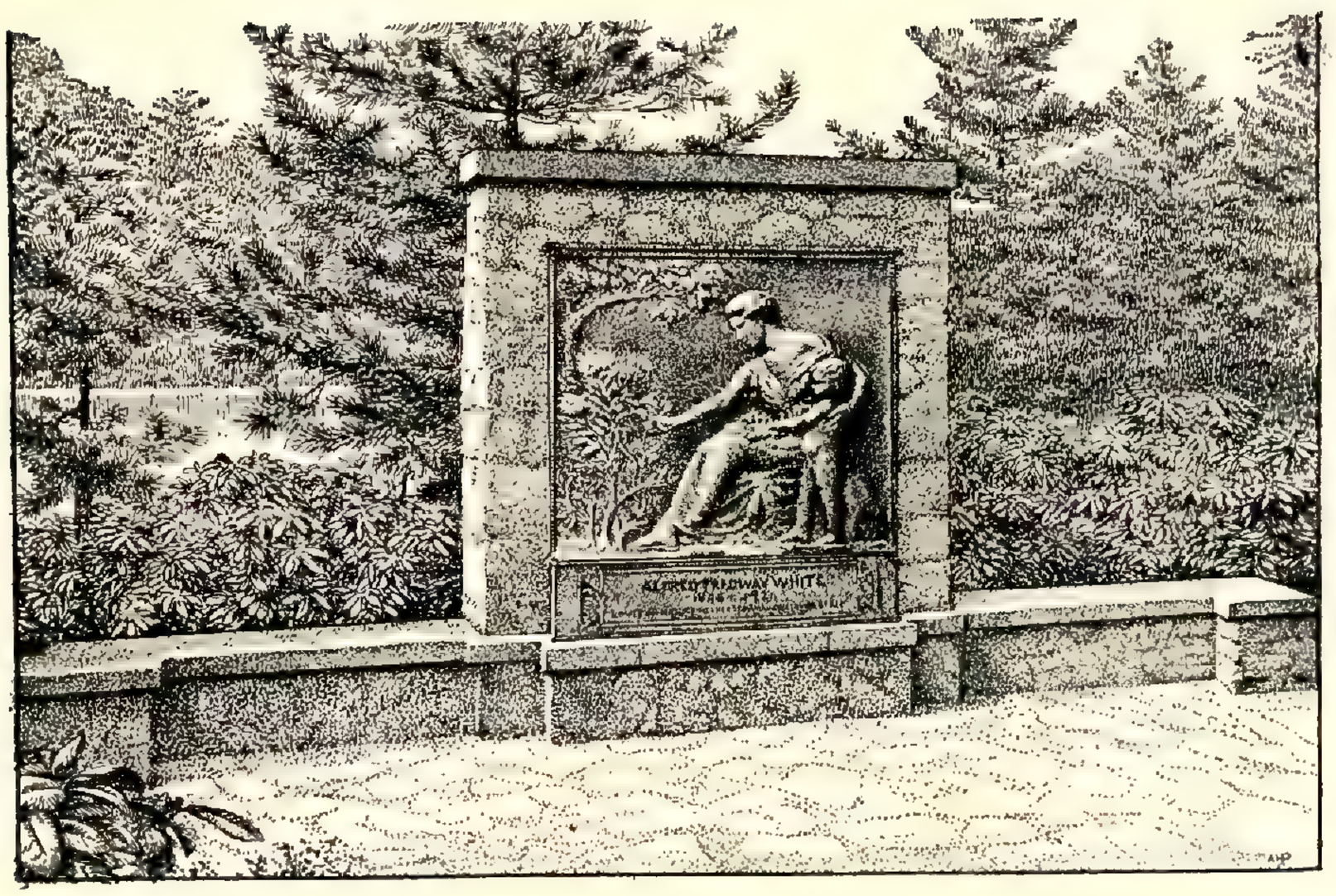
VOL. XXII APRIL, 1933 NO. 2

TWENTY-SECOND ANNUAL REPORT

OF THE

BROOKLYN BOTANIC GARDEN

1932



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"A botanic garden and arboretum for the collection and culture of plants, flowers, shrubs and trees, the advancement of botanical science and knowledge, and the prosecution of original researches therein and in kindred subjects; for affording instruction in the same, and for the prosecution and exhibition of ornamental and decorative horticulture and gardening, and for the entertainment, recreation and instruction of the people."—*Laws of New York, 1897, Chapter 509. An Act providing for the establishment of a Botanic Garden in the city of Brooklyn.*

TWENTY-SECOND ANNUAL REPORT

OF THE

BROOKLYN BOTANIC GARDEN

1932

FOR THE ADVANCEMENT OF BOTANY
AND THE SERVICE OF THE CITY

BROOKLYN, N. Y.
APRIL, 1933

THE BOTANIC GARDEN AND THE CITY

THE BROOKLYN BOTANIC GARDEN, established in 1910, is a Department of the Brooklyn Institute of Arts and Sciences. It is supported in part by municipal appropriations, and in part by private funds, including income from endowment, membership dues, and special contributions. Its articulation with the City is through the Department of Parks.

The City owns the land devoted to Garden purposes, builds, lights, and heats the buildings, and keeps them in repair, and includes in its annual tax budget an appropriation for other items of maintenance. One third of the cost of the present buildings (about $300,000) and of other permanent improvements (about $253,000) has been met from private funds.

Appointments to all positions are made by the director of the Garden, with the approval of the Botanic Garden Governing Committee, and all authorized expenditures for maintenance are made in the name of the private organization, from funds advanced by the Institute, which, in turn, is reimbursed from time to time by the City, within the limits, and according to the terms of the annual Tax Budget appropriation.

All plants have been purchased with private funds since the Garden was established. In addition to this, it has been the practice of the Garden, from its beginning, to purchase all books for the library, all specimens for the herbarium, all lantern slides and photographic material, and numerous other items, and to pay certain salaries, with private funds.

The needs of the Garden for private funds for all purposes, are more than twice as great as the present income from endowment, membership dues, and special contributions. The director of the Garden will be glad to give full information as to possible uses of such funds to any who may be interested.

INFORMATION CONCERNING MEMBERSHIP

The Brooklyn Institute of Arts and Sciences is organized in three main departments: 1. The Department of Education. 2. The Museums. 3. The Botanic Garden.

Any of the following seven classes of membership may be taken out through the Botanic Garden:

1.	Annual member	$ 10
2.	Sustaining member	25
3.	Life member	500
4.	Permanent member	2,500
5.	Donor	10,000
6.	Patron	25,000
7.	Benefactor	100,000

Sustaining members are annual members with full privileges in Departments one to three. Membership in classes two to seven carries full privileges in Departments one to three.

In addition to opportunities afforded to members of the Botanic Garden for public service through coöperating in its development, and helping to further its aims to advance and diffuse a knowledge and love of plants, to help preserve our native wild flowers, and to afford additional and much needed educational advantages in Brooklyn and Greater New York, members may also enjoy the privileges indicated on the following page.

Further information concerning membership may be had by addressing The Director, Brooklyn Botanic Garden, Brooklyn, N. Y., or by personal conference by appointment. Telephone, Prospect 9–6173.

PRIVILEGES OF MEMBERSHIP

1. Free admission to the buildings and grounds at all times.
2. Cards of admission for self and friends to all exhibitions and openings preceding the admission of the general public, and to receptions.
3. Services of docent (by appointment), for self and party (of not less than six), when visiting the Garden.
4. Admission of member and his or her immediate family to all lectures, field trips, and other scientific meetings under Garden auspices, at the Garden or elsewhere.
5. Free tuition in most courses of instruction; in other courses members are allowed a liberal discount from the fee charged to non-members.
6. Invitations for self and friends to spring and fall "Flower Days."
7. Copies of Garden publications, as follows:
   a. Record.
   b. Guides.
   c. Leaflets.
   d. Contributions.
8. Frequent Announcement Cards concerning plants in flower and other exhibits.
9. Privileges of the Library and Herbarium.
10. Expert advice on the choice and care of ornamental trees, shrubs, and herbaceous plants, indoors and out, on planting the home grounds, the care of lawns, and the treatment of plants affected by insect and fungous pests.
11. Determination of botanical specimens.
12. Participation in the periodical distribution of surplus plant material and seeds, in accordance with special announcements sent to members from time to time.

FORMS OF BEQUEST TO THE BROOKLYN BOTANIC GARDEN

Form of Bequest for General Purposes

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, the income from which said sum to be used for the educational and scientific work of the Brooklyn Botanic Garden.

Form of Bequest for a Curatorship

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, as an endowment for a curatorship in the Brooklyn Botanic Garden, the income from which sum to be used each year towards the payment of the salary of a curator in said Botanic Garden, to be known as the (here may be inserted the name of the donor or other person) curatorship.

Form of Bequest for a Fellowship

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, the income from which sum to be used in the payment of a fellowship for advanced botanical investigation in the Brooklyn Botanic Garden, to be known as the .....fellowship.

Form of Bequest for other particular purposes designated by the testator

I hereby give, devise, and bequeath to The Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y., the sum of.....Dollars, to be used (or the income from which to be used) for the Brooklyn Botanic Garden *

.....

.....

*The following additional purposes are suggested for which endowment is needed:

1. Botanical research.
2. Publishing the results of botanical investigations.
3. Popular botanical publication.
4. The endowment of a lectureship, or a lecture course.
5. Botanical illustrations for publications and lectures.
6. The purchase and collecting of plants.
7. The beautifying of the grounds.
8. The purchase of publications for the library.
9. Extending and enriching our work of public education.
10. The establishing of prizes to be awarded by the Brooklyn Botanic Garden for botanical research, or for superior excellence of botanical work in the High Schools of the City of New York.

FIG. 1. Locust (*Robinia boyntoni*) in full bloom. June 2, 1932. (8191.)

TWENTY-SECOND ANNUAL REPORT

OF THE

BROOKLYN BOTANIC GARDEN

1932 [1]

To the Botanic Garden Governing Committee:

I have the honor to present herewith the twenty-second annual report of the Brooklyn Botanic Garden, covering the year 1932.

A traveler motoring through the American desert soon comes upon a sign reading as follows: "Dip: 300 feet." With unfeigned apprehension he grasps the hand strap and prepares for the perilous descent, only to discover that his car glides gradually down and smoothly up again. The "dip" was only 300 feet ahead, not 300 feet deep as he had feared. After several such experiences he begins to wonder what has caused these "dips." He soon discovers, or is told, that they are stream courses, full of water only at intervals. If the stream flowed without interruption a bridge would be built over the stream-course and the traveler would continue his progress at a uniform level. But periodically the stream dries up, leaving *a depression,* into which and through which the traveler must go if he would continue to progress. He soon learns that all these depressions are not parallel to his course, but at right angles to it, and that he always comes safely out again.

So it seems to be in the history of an institution. It moves forward with the rest of the world until the warning sign appears and then, like everything else dependent on finance, it moves inevitably toward and into the depression. The stream of financial support has partly if not wholly dried up. This, alas, seems to be the history—the normal method of progress—of most financial and financed institutions.

The Brooklyn Botanic Garden, for example, was established (in

[1] Brooklyn Botanic Garden Record, Vol. XXII, No. 2, March, 1932.

1910) as our country was only just recovering from the depression of 1907–08. In 1914 we moved into our completed building just as there was beginning in Europe the greatest debacle in history, which was soon to engross the attention of the world and which taxed every source of public and private support, diverting funds from all peace-time activities.

The Botanic Garden went into and through the successive financial depressions, but it continued to move forward. About 1930 the warning sign again appeared and the Botanic Garden now finds itself, with the rest of the world—. There is no need to complete the sentence. Every reader of these lines is face to face with the situation.

Importance of Adequate Support for Science and Education

The greatest tragedy of financial depressions is not diminished income nor the loss of fortunes, distressing as that may be, but the attendant spiritual and moral slump. Hence the great importance of continued support of all those agencies and institutions (schools, museums, botanic gardens, etc.) which minister to spiritual needs by promoting science, art, education, and culture. These things are not luxuries; they are necessities of life.

One of the significant phenomena of the past eighteen months of one of the world's greatest financial stresses has been the increased use of our public libraries and museums and all free agencies of adult education and culture. Those with enforced leisure have turned instinctively to that which offers moral support and ministers to the spirit. Economic adversity has given additional leisure for self-improvement. What a pity, therefore, that our educational institutions—schools, museums, botanic gardens, et cetera—should be obliged to curtail their services just at the time when they are more needed than ever.

To be sure, sick babies must be cared for, hospitals *must* have support, there must be bread at the end of the bread-lines, work must be provided for all who need it, but we should be in a sorry plight indeed if it were deliberately planned to meet these

needs largely at the expense of ministrations to the mind and spirit.[1]

Botanic Gardens Are Also Employers

The Botanic Garden has held its own fairly well financially, during the past year, but of course there have been resignations from our membership. Some of the letters of resignation have stated that the member was resigning because of contributions made to one or more of the various agencies organized to provide employment. The fact tends to be lost sight of that the Botanic Garden is also an employer of labor. Is it not better, from the standpoint of both economics and morale, to provide funds for continuing employees in normal employment than to withdraw such support, thereby adding to the number of the unemployed while contributing to unemployment relief.

During the past few months more than one person has remarked to the writer that, in the existing situation, he thought "museums and botanic gardens could wait," wholly losing sight not only of the vital importance of their ministrations to human needs, but of the fact that, if that point of view should become general concerning educational institutions, thousands would thereby be thrown out of employment.

It has also been seriously suggested by some that in a period of depression botanic gardens and museums should not add to their libraries or scientific collections—should not buy plants and books—apparently losing sight of the fact that hundreds of thousands depend for their livelihood upon producing and marketing plants and books. If the largest consumers of these things cease to make purchases, the business depression is only accentuated. A great need, just now, is that business shall be kept as normal as possible. No contributions can be more effective than those which tend to insure this.

I have entered into some detail in these matters because it has

[1] In this connection it is interesting to note that Justice Haddon, in a court in Richmond, Virginia (according to a dispatch in the New York *Times* of December 23, 1932), recently ruled that flowers are a necessity in human lives, quite as much as fuel, meat, vegetables. In harmony with this view he ruled that vendors of flowers raised by themselves need not pay the license tax from which those who sell "family supplies" are exempt.

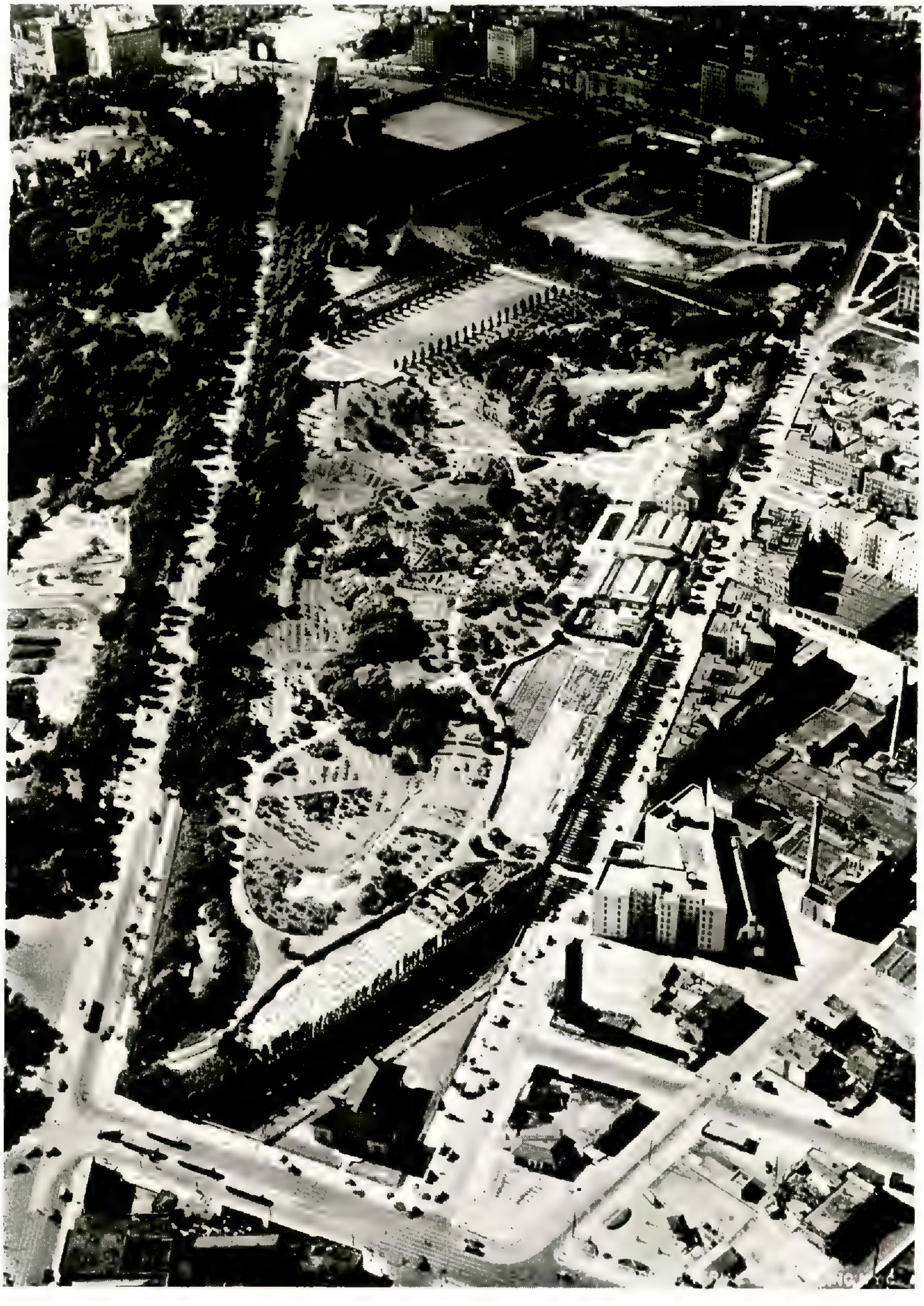

FIG. 2. Brooklyn Botanic Garden. Airplane view, June 23, 1932. Flatbush Ave. at the left; Washington Ave. at the right; Empire Boulevard at the south. At the upper (north) end are the Mt. Prospect Reservoir (left), and the Brooklyn Museum (right), Public Library (unfinished) west of Reservoir. Girls Commercial High School at the right of the Museum.

become evident during the past few months that many people have been accustomed to regard such institutions as botanic gardens, museums, and zoological parks as luxuries, very nice to have in prosperity, but organizations that may quite well be curtailed in periods of depression, the fact being lost sight of that these institutions are part of the economic fabric of life, as well as of the educational and cultural.

The Functions of a Botanic Garden

In his recent book on *Universities,* Flexner notes that scholars and scientists should be conscious of four major concerns: "the conservation of knowledge and ideas; the interpretation of knowledge and ideas; the search for truth; the training of students who will practice and 'carry on.'" If we could smash our existing universities to bits, says Dr. Flexner, and remake them to conform to our heart's desire, they would possess these four characteristics. Such, indeed, are, or should be the ideals of the modern botanic garden.

The conservation of knowledge and ideas is accomplished by the herbarium and the library. "The images of men's minds remain in books," said Francis Bacon. So do the conceptions of former botanists remain in botanical publications and in herbaria. Herbaria preserve not only botanical facts (in the form of dried specimens) but also, by their arrangement and the data on the herbarium sheets, they preserve many of the conceptions and generalizations of the makers of botany.

Between the Museum and the Reservoir is the "North Addition" of the Garden (undeveloped), fronting on Eastern Parkway. South of the Reservoir is the Local Flora Section. The rectangular area is the Esplanade, to serve as the approach to the Museum building when completed. The Lake and Japanese Garden at the right of the Esplanade, with flowering trees between. The central part of the Garden is occupied by the General Systematic Section. Laboratory Building and Conservatories (with Waterlily Pools) along Washington Ave. at right center; Rock Garden directly opposite along Flatbush Ave.; Experimental Garden south of Conservatories. Children's Garden and Children's Building at south end, separated from Brighton Line R. R. cut by row of Lombardy Poplars. Terminal Pool of the Brook north-west of Children's Garden. (By permission, Fairchild Aerial Surveys, Inc. No. 64528.) Cf. Fig. 3.

The interpretation of knowledge and ideas is accomplished primarily by the organized and labeled collections of living plants in plantations and conservatories; also by the botanical museum (where there is one), and in a wider way by the circulation of popular and technical publications. By means of the various collections visual instruction is afforded to the general public, and the more formal instruction of botanical students is facilitated. Herbarium and library also function here, as well as in the conservation of knowledge.

The search for truth is carried on in laboratory, herbarium, plantation, and field, supplemented by the library, for all exploration proceeds to the unknown from the known.

While the training of students is an integral function of the university, it may or may not be a function of a botanic garden or other research institution. It has always been a function of the Brooklyn Botanic Garden.

These four lines of activity were very definitely in mind when the organization of the Brooklyn Botanic Garden was conceived over twenty years ago. The extent to which they have been realized has been limited only by the funds available, and the inevitable restrictions of environment—area, climate, urban conditions, et cetera.

With these ideals in mind, the needs of the Garden as to equipment and personnel follow as a matter of course. That such an institution was needed, both in this city and in the botanical world at large, the history of the past twenty-two years bears ample witness. The extent to which accomplishment has fallen below the ideal is not wholly discouraging, since the right kind of ideals for an institution can never be completely realized. Those who have been the active participants in the work only hope that, to those who have watched and encouraged and promoted it, the results have not been disappointing.

The Plantations and Grounds

Aesthetics and Education

Besides its scientific and educational activities, a botanic garden serves the public in two ways—aesthetically and environmentally (by affording a locus or background for profitable leisure).

The educational object cannot be carried out effectively unless the plantations are made as beautiful as possible. The popular presentation of the facts and principles of plant life will be immeasurably more effective if the garden is a place of beauty, just as a lecture on botany is more effective if it has literary value—is couched in beautiful language. Not only is beauty itself educative, but it enhances the effectiveness of every method of instruction along other lines.

A grouping of flower beds or a massing of shrubbery may serve merely to exhibit plants which are of interest to the botanist, but it may have little or no artistic merit. Or the arrangement or massing of the same materials may be handled in such a way as to produce a pleasing effect. This is why it is so important to have the constant cooperation of botanist and landscape architect in planning and maintaining the plantations of a botanic garden. A botanically fascinating collection of plants may be grown in a nursery; but a nursery is not a garden, it is a source of materials for making a garden. Herein, as the writer has stated elsewhere, lies an essential difference between botany (in its restricted sense) and horticulture (as a phase of botany); for the botanist a garden exists for plants; for the horticulturist plants exist for the garden. In laying out the Brooklyn Botanic Garden the aim has been to enlist the aid of horticulture and landscape architecture to arouse and foster a wider botanical interest in plants. It is gratifying to be able to report that this aim is meeting with success, as the constantly increasing attendance and public interest and educational use of the plantations indicate.

A class in Landscape Architecture from the School of Fine Arts, University of Pennsylvania, visited the Garden recently to make a study of the various types of landscape design represented in the Garden, including the Japanese Garden, Rose Garden, Rock Garden, Water Gardens, and other specialized types of gardens.

Increasing Public Appreciation of Parks

It is encouraging to note the growing appreciation of the value of municipal parks on the part of the American public, for a city botanic garden incidentally affords some of the advantages of a park. The National Recreation Association has recently issued

a report on parks and recreation centers given or bequeathed to American cities by individuals. The total area of these various gifts is 75,000 acres, valued at more than $100,000,000. The following cities report that every acre of their existing parks was secured by private gift: New Brunswick, New Jersey; Oneonta, New York; Raleigh, North Carolina. The same is true of the two parks of Norwich, N. Y. In Pittsburgh, Pa., Frick Park, of 150 acres, was willed to the city by Mr. Henry C. Frick, together with a fund of $2,000,000 as an endowment for maintenance. The gift of Look Memorial Park to Northampton, Mass., was accompanied by a fund of $450,000 for development and maintenance. The gift of Kirby Park to Wilkes-Barre, Pa., was accompanied by two gifts totaling $370,000 for development and $500,000 as an endowment fund. Other instances might be cited of the generous provision of private funds for such a purpose.

Although the grounds of the Brooklyn Botanic Garden were provided by the City, the Garden, during its twenty-two years of existence, has received from individuals one gift of $250,000, one of $50,000, and one bequest of $243,149, not to mention numerous smaller gifts and bequests. The Citizens Endowment Fund of $253,929 was contributed in 1926 by about 640 subscribers. But the cost of maintaining a Botanic Garden of given area is greatly in excess of the cost of maintaining a park of the same area, because the grounds are much more intensively developed, the trees, shrubs, and herbaceous plants are more rare and expensive than those of an ordinary park, the collections must be labeled and must be in charge of experts, and a program of scientific study and public education based upon the collections must be supported. In several ways the cost of maintaining a botanic garden in such a large city as Brooklyn is greater than it would be in a smaller city.

The gifts above recorded, together with the generous support already received from the people of Brooklyn and the greatly increasing use of all facilities of the Botanic Garden by our residents, encourage the director to hope that the much needed additional gifts and unrestricted endowment will be realized in the not distant future.

The Nature of Our Exhibits: Subjects and Objects

The conception of a museum as a collection of labeled *objects* is a familiar one. The function of a museum as an exhibit of *subjects* is less familiar; it has recently been stressed by the Buffalo Museum of Science which opened its new building in 1929. It has rooms devoted, not to rocks and fossils, but to geology; not to animals, but to zoology; not to plants, but to botany. Other rooms are devoted to such subjects as heredity and evolution. This is in the direction away from mere public *instruction* and approaching public *education*. There is a difference between the two.

The conception of a botanic garden as an outdoor museum has been more consciously recognized in recent years, but most persons still think of a botanic garden as exhibiting only *plants*—a place where one may go to see plants and learn their names. The Brooklyn Botanic Garden has from the beginning developed along the line of exhibiting *subjects* as well as objects. The Japanese Garden was an early development along that line. Our Rose Garden exhibits not only roses, but illustrates the history of the horticultural rose. Our Ecological Garden illustrates the *relation* of plants to their environment. Our General Systematic Section illustrates the *inter-relationship* of plant families, and certain aspects and conceptions of plant evolution. Our Local Flora section illustrates ecology and plant geography—as well as local flora plants.

The same is true of our Conservatory exhibits: The Economic House illustrates economic botany; House No. 2 is chiefly devoted to the *subject* of plant evolution; another exhibit illustrates house plants; another, adaptation to desert conditions; and so on.

In harmony with this idea our *Guides* are guides not merely to the exhibit but also to that aspect of botanical science illustrated by the given exhibit. For example, our Guide to the Rock Garden, while based upon our own rock garden, is in effect an elementary treatise on the general subject of rock gardens. Collections installed from this point of view (whether in museums or botanic gardens) serve a much larger educational purpose than when the installation centers only in the various plants.

FIG. 3. Brooklyn Botanic Garden. Airplane view (April 24, 1932), showing the dense population surrounding the Garden. At left distance the tall buildings of the Wall Street area, Manhattan. At extreme right distance, the Empire State Building. Prospect Park at the left of the Garden. (By permission, Fairchild Aerial Surveys, Inc. No. 64287.) (B. B. G. Neg. 8195.) Cf. Fig. 2.

The North Addition

Perhaps the greatest disappointment of the year is the abortion of our plans for the improvement of the tract between Mt. Prospect Reservoir and the Brooklyn Museum, and fronting on Eastern Parkway. Ever since this tract of about three acres was incorporated in the Botanic Garden in 1912 it has been, so to speak, under the plow. Grading it down to the street level left a surface of subsoil. The upper three or four inches have been converted into "top soil" by growing successive crops of barley and buckwheat, and plowing them under, supplemented by several applications of fertilizer.

Owing to the ups and downs of financial conditions, referred to in earlier paragraphs, funds have never become available for the completion of the soil improvement, landscaping, and planting. Finally, in 1930, the Board of Estimate and Apportionment made an appropriation of $24,100 for this work. As stated in my Report for 1931, the contract was twice advertised for public bids (in September and December, 1931), but each time the lowest bid received was in excess of the amount provided. Then came the financial crisis, and the City felt obliged to cancel the appropriation. The completion of this improvement is one of the most urgent needs of the Botanic Garden. With a minor exception, this is our last undeveloped area. Its present condition detracts from the beauty and the educational effectiveness of the Garden as a whole.

Local Flora Section

This area is popularly known as the "Native Wild Flower Garden." As often stated before, it contains only species that grow wild within the Torrey Botanical Club range—roughly speaking, within a radius of one hundred miles of Brooklyn. Dr. Svenson, curator in charge, has worked out a plan for an ecological treatment, so that, as previously noted, not only are the local flora trees, shrubs, and herbaceous plants exhibited, but the subject of the relation of plants to their environment is also illustrated. It was felt that the subject of plant classification (systematic botany) is amply illustrated in the General Systematic section, which occupies the main central portion of the grounds.

A fuller and interesting statement of this development will be found in the accompanying report of Dr. Svenson on pages 96–99.

Other Sections

The appended reports of the horticulturist (pages 102–107) and of the curator of plants (pages 91–96) record the year's progress in the development and maintenance of other sections of the Plantations. Mr. Free's report also records essential facts in the general maintenance of the grounds.

Drought

The appended report of the Horticulturist calls attention to the fact that the Garden has experienced continuous drought (rainfall below normal) for five consecutive seasons. Most trees and shrubs, under proper care, can withstand one season of drought, or even two in succession, but five seasons are almost too much for many of them. Constant irrigation has been necessary day and night, from June to October. This experience has emphasized how inadequate to our needs the present irrigation system is. The pressure needs to be increased and more outlets are required.

Twelve Months of Bloom

The "Christmas Rose" (*Helleborus niger*) came into bloom in the Rock Garden early in December, before snow had fallen. Subsequently it became covered with several inches of snow, but continued in bloom after the snow had melted away some days later. It was still in bloom the day before Christmas and up until New Year's, 1933. The showy, anemone-like flowers with slightly pink-tinged petals and numerous golden stamens seemed strangely out of season at Christmas time and naturally attracted considerable attention. One of the Stork's Bills (*Erodium Manescavi*), of the Geranium Family, was also in bloom during the second week in December and up until Christmas. The flowering of these plants completed a record of twelve months of outdoor bloom for 1932 as against eleven months for 1931. In 1930 we were able to report twelve months of bloom, beginning with *Iris Vartani* in January, as also in 1932.

A Little Auk in the Botanic Garden.—During the last week in November the local newspapers contained items concerning a considerable number of birds known as the Little Auk, Dovekie, or Sea Dove (*Alle alle*), which were blown from northern latitudes down to the vicinity of New York City and Long Island by the severe storm which took place at that time. One of these birds was found alive in the Botanic Garden, but it is impossible for them to remain alive for more then a very few days in this latitude and environment. Our specimen was captured alive but soon died. It was mounted by one of our own men, who is an amateur taxidermist.

It is interesting in this connection to note that during the fall a beautiful large parrot led a free existence in the open in the Botanic Garden until he was apparently overcome by excessive cold weather. Efforts to capture him were unavailing. It may also be noted that during the past summer a parrakeet made his headquarters in the Botanic Garden. It is thought that the parrot and parrakeet were set free in the Garden by some one who became afraid of contracting the parrot fever, psittacosis.

International Seed Exchange

The demands for seeds from other botanic gardens was heavier in 1932 than ever before. More than 120 gardens and other institutions in more than 20 foreign countries sent requests. The total number of seed packets supplied was 4555, as against 2397 in 1931. In fact, the number of packets requested was about 500 in excess of our ability to respond. The seeds were collected from plants growing in the Botanic Garden, from wild plants of this region, and from Oregon, Tennessee, Maine, and other localities, through the cooperation of collectors in those regions. Out of 808 packets requested by members of the Garden we were able to supply 688. Members' requests were about 16 per cent. of the total number of requests, and the packages supplied to members about 15 per cent. of the total supplied.

Conservatories

The Conservatory attendance for the year was 123,036, as against 84,429 in 1931 and 40,093 in 1930. The largest monthly

attendance was 19,969 in May; the smallest, 4,906 in November. The average Sunday attendance for April was 1,262, and for May, 1,599, with a maximum daily attendance of 3,058 on May 15. The average attendance for April was reduced by very stormy weather on April 10, when there were only 15 visitors. The small November attendance was no doubt due to the unusually lovely weather, which tempted people to remain out of doors rather than enter a greenhouse.

A series of eight transparencies showing imaginary landscape views of geological ages from Cambrian to Cretaceous was installed in Conservatory House No. 2 in June. In addition there is another transparency illustrating probable principle lines of descent in plant and animal evolution. These transparencies measure 15 x 22 inches. They supplement the exhibit of living plants on the central bench of House No. 2, illustrating the probable course of plant evolution from Algae to Flowering Plants. The original reconstructions and drawings were made by Miss Maud H. Purdy, Botanic Garden artist, under the supervision of Dr. Gundersen, curator of plants. The photographic work was done by the Garden photographer, Mr. Buhle.

In connection with this exhibit Guide No. 8, "The Story of Fossil Plants," was written by Dean Edward W. Berry, professor of paleontology, Johns Hopkins University, and published as the July number of the Botanic Garden RECORD.

The Succulent House has been kept closed to the public during most of the year owing to the tendency of the smaller specimens to disappear on account of the prevailing vogue for "desert dish gardens" and the wave of popularity of succulents in general. The state of Arizona has a wild flower preservation law forbidding the shipment of cacti from that state except under definite restrictions. We have had to meet the local situation in a different way. The installation has been modified to safeguard the plants so that they may be viewed *in situ* by those who are content to enjoy them that way.

PUBLIC RELATIONS

The term "public relations" is used to designate our relations with the general public as a whole, as distinguished from our relations with schools and other institutions and organizations.

The relation between an educational institution and its community is a reciprocal one. The institution should render a definite service to the community; in return it is justified in looking to the community for adequate support. The generosity and spontaneity of public support is a true measure of the extent to which the community appreciates the importance of institutions established to promote knowledge and education and culture.

In the period of the founding of Rome, war was the chief concern of the community and of every man in it. Of course this was war with neighboring cities. Cities do not fight each other any more, but war has continued to be the chief concern of every city and town, and doubtless always will be—war against famine, disease, crime, political corruption, ignorance. These are not only the traditional but the ever present, ever aggressive enemies of our cities. The surest way to conquer them all is to conquer the last. It is the aim of modern museums and botanic gardens, as well as of the schools, to contribute their mite toward this end. The response of the public during 1932 to the educational program offered by the Garden is evidence that progress is being made in this direction.

Attendance.—Reference was made above to the fact that during this period of financial reverses attendance at botanic gardens and museums has increased. "Of course," one may say, "people have more leisure." But it is significant that they use their leisure in that way. Perhaps, if they normally had more leisure, they would regularly make larger use of these instruments of adult education.

The total attendance during 1932 was 1,307,964, an increase of 200,925 over the preceding year. Attendance data may be found in the accompanying report of the curator of public instruction (page 67).

The attendance during January and February surpassed all previous records for those two months. The figure for January was 50,832, as against 48,600 for January, 1930, the latter being the highest recorded for this month previous to 1931. For February the attendance was 71,339—far above the highest previous figure for this month, namely, 61,419 in 1929.

More than one quarter of a million visitors (232,737) were

registered by the turnstiles for the month of May—a record attendance for any month, the highest previous figure being 169,486 in May, 1931. The May, 1932 figure is nearly one half the whole attendance for the year 1924, namely, 435,091.

The week-end attendance of May 14 and 15, as registered by the turnstiles at the five entrances, was 38,804, far surpassing the number at any previous week-end in the history of the Garden. The largest previous figure was 28,662 on Saturday and Sunday, April 18 and 19, 1931. The attendance for whole months during the early years of the Garden rarely exceeded the figure for May 14 and 15. As recently as 1920 only one month of the year, namely July, with 53,323, recorded a higher figure. On Memorial Day (Monday) and the preceding Saturday and Sunday (May 28–30) the registered attendance was 45,871. The Garden, as usual, was not opened until noon of Memorial Day.

Attendance always falls off in the summer because many are out of the city. The schools are closed and teachers are not bringing classes, many adults are away for the season, and many who remain either go to the beaches or spend their week ends out of the city. However, on Saturday and Sunday, July 16 and 17, there were more than 12,000 visitors, for the weather was favorable and the Garden was approaching the height of its mid-summer beauty.

News Releases.—The curator of public instruction reports that more than 1560 clippings of news items concerning the Garden or mentioning it have been received during the year from a clipping agency. There have been numerous other items in magazines and professional journals not surveyed by clipping agencies. While part of these notices were based on our own news releases, sent by the department of public instruction (see p. 73) and by the Brooklyn Publicity Bureau, partly through Associated Press, many of them were spontaneous on the part of the newspapers, including, during 1932, a larger number of editorials than hitherto. This is evidence of wider public interest in plant life and also evidence that the Botanic Garden's activities are responding to this interest and meeting public needs in a constantly increasing degree.

Broadcasting.—In connection with Cooperative Extension Work in Agriculture and Home Economics of the State Agricultural Experiment Station of New Jersey, Mr. Free has given nine

broadcasts for the Radio Garden Club. He has also given one radio talk for the American Rose Society.

Bureau of Public Information.—This phase of our activities, mentioned in previous reports, continues to increase in amount and importance. A matter of special interest is the considerable number of requests by mail from other states where there is a State agricultural college or experiment station where, presumably, such information might be obtained. This may possibly result from the almost nation-wide newspaper publicity referred to in a preceding paragraph.

For the purpose of this report the thing to be emphasized is the fact that in numerous ways the Brooklyn Botanic Garden is rendering an ever increasing service to the general as well as the local public and the narrower world of botany and horticulture.

Articles in Periodicals.—In addition to scientific contributions in technical journals, and reviews, members of staff, during the year, have contributed 73 popular articles to newspapers and magazines. These include a series of 44 articles in the New York *Sun* by the curator of elementary instruction, weekly from January to November. The horticulturist has also conducted a "question and answer" department in the *Sun* on gardening and general horticulture.

Public Education

Courses of Instruction.—The *Prospectus* of courses for 1932 listed 30 courses, of which 21 were for adults and nine for children of high school age or younger. All of these courses were well attended, the total enrollment figures being 1377 (Adults, 780, Children, 597).

The number of lectures, addresses, informal talks, and class exercises for the year has reached the total of 1762, as follows:

1.	Sessions of regular classes	907
2.	Sessions of visiting classes	709
3.	Lectures to adults at the Garden	46
4.	Lectures to elementary and high school children	561
5.	Addresses at schools and clubs (extra mural)	91
6.	Radio talks broadcast	9
		2323
	Less duplication (lines 2 and 4)	561
	Net total	1762

FIG. 4. The Esplanade, facing south, showing recreational use of the Garden. May 18, 1932. (8084.)

The duplication is explained by the fact that the 561 lectures recorded in line 4 were given to that many of the 709 classes reported in line 2. The 148 other visiting class sessions did not involve lectures.

This total of 1762 is the figure that should be compared with the total number of lectures reported by museums and gardens that confine their educational program largely or wholly to public lectures. As stated in previous reports, the Botanic Garden, sometime ago, subordinated public lectures to class work. The wisdom of this, from the standpoint of educational values, becomes more evident each year.

Classes for Nurses.—Attention has been called to this innovation in preceding reports. The work increases in scope and interest and attendance. During the year three hospitals have sent their nurses' training classes, not for isolated lectures, but for regular courses of instruction, as follows: Prospect Heights Hospital (40 students), Kings County Hospital (81 students), and St. John's Hospital (50 students). The course consists of conferences, demonstrations, and field trips, and the subjects include the elementary principles of plant life, the use and care of cut flowers and potted plants in the sick room, and the identification of medicinal plants in the field. The course is in charge of the curator of public instruction.

Docentry.—On account of the extent of our scheduled educational work (classes, flower days, etc.) the call for the services of a teaching guide or docent to conduct parties visiting the Garden is less than it might otherwise be. During 1932, 27 parties (not classes) have had the service of a docent by request.

Extra-Mural Talks.—Requests for addresses, lectures, and informal talks outside of the Garden have increased to such an extent that it has been necessary to restrict our response to certain conditions, and to certain types of institutions and organizations; schools and scientific societies are given the preference. The 91 such talks given during 1932 had a total attendance of 19,186.

Exhibits.—Seventeen exhibits have been installed during the year, mostly outside the Botanic Garden. These exhibits have been viewed by more than 40,800 persons. Details of these exhibits are given in the appended departmental reports.

Guide Books.—We have noted on page 25 that the Botanic Garden Guides are intended, not merely to describe the exhibit on which they are based, but to serve as a more or less elementary or introductory treatise on the general subject which the exhibit represents. Two Guides have been published during the year, as follows:

Guide No. 7.—"The Story of Our Boulders: Glacial Geology of the Brooklyn Botanic Garden," with 22 illustrations. The main portion of this Guide is by Dr. Ernst Antevs, Research Associate, American Geographical Society of New York, formerly of the University of Stockholm and one of the leading authorities on glacial Geology. The "Introduction" gives a brief resumé of the historical development of the glacial hypothesis.

Guide No. 8.—"The Story of Fossil Plants," with eight illustrations. The text is by Dean Edward W. Berry, professor of paleontology in the Johns Hopkins University, one of the foremost authorities on fossil botany. This guide, based on eight transparencies of imaginary landscapes of previous geological periods, serves as a popular introduction to paleobotany.

Reprints of Guide No. 6.—This is the Guide to our collection of *Japanese potted trees* (*Hachinoki*), presented to the Garden in June, 1925, by Mr. Ernest F. Coe, of New Haven, Connecticut. The text is by Mr. Bunkio Matsuki (now resident in Japan), and the Guide has aroused a great deal of interest in horticultural circles. On request, permission was granted for its republication, in full, in the following journals: *Investigacion y Progreso* (Vol. VI: p. 73. May, 1932) Madrid; *National Horticultural Magazine* (Vol. XI: p. 283. October, 1932) Washington, D. C.; and *Revue Horticole Suisse* (Vol. V: p. 201. September, 1932), Geneva, Switzerland. A summary of the article was published in *La Tribune Horticole* for February 20, 1932, followed by additional notes in the issues for February 27 and March 26, all with illustrations. The illustrations in the European journals were printed from half-tone cuts loaned by the Garden.

Educational Tablets.—It is part of our program to make the grounds of the Garden as rich educationally as is consistent with the general purpose of the Garden, especially with reference to all natural features. It is in line with this ideal that bronze tablets

have been placed on twenty-eight of the larger or more interesting glacial boulders uncovered in the Garden during grading operations. These tablets tell the lithological composition of the boulders and the fact that they were transported to the present site of the Garden by the continental ice sheet during the last glacial epoch. Their approximate place of origin is also noted, varying all the way from the southern border of the Adirondack Mountains to the northern end of Manhattan Island. For this data we are indebted to the cooperation of Dr. Robert Balk, professor of geology at Hunter College, New York City. The tablets were the gift of Mr. Edward C. Blum, president of our Board of Trustees. They have been the center of widespread interest.

On December 17, the Boys and Girls Club of the Garden presented a most generous gift of $50 for the purpose of providing a large bronze tablet, to be affixed in 1933 to a glacial boulder at the base of Boulder Hill. On this tablet will be given the essential information concerning the geological origin and significance of the hill.

School Service

The statistics given in Table I, on page 38, are a quantitative expression of the nature and extent of our service to the public and private schools of Brooklyn. More extended statements are given in the appended reports of the curators of public and of elementary instruction.

In addition to the supply of large quantities of study material to all grades of schools from Grade III A to the University, lectures and class instruction are given to visiting classes in the classrooms, plantations, and conservatories, covering 65 topics (29 scheduled and 36 additional by request of the schools) correlated with the course of study. These topics cover commercial geography and the plant life of the various countries, for Junior High Schools and grades below, as well as plant industry, nature study, and botany.

The visits of these classes serve primarily to enrich the pupil's stock of information concerning plant life, to give concrete and definite mental images concerning material that would be quite inaccessible to most city children except for the Botanic Garden, to stimulate interest beyond what would be possible by merely

TABLE I

Statistics of School Service

	1932	1931
Conferences with Teachers		
No. of conferences	83	67
No. of teachers involved	2,137	6,668
No. of pupils involved	95,695	397,512
Loan Lectures (Lantern Slides, etc.)		
No. of sets lent	22	36
No. of teachers involved	159	315
No. of pupils attending	6,320	13,387
Material Supplied		
Total number of requests from schools	643	934
Number of different institutions	220	222
High Schools and H. S. Annexes		
Brooklyn (Total No. 41)	29	30
Queens (Total No. 17)	9	10
Manhattan (Total No. 27)	14	17
Other Boroughs (Total No. 17)	5	13
Junior High Schools (Total in Brooklyn, 22)	25	20
Colleges and Universities (Total in Brooklyn, 7)	11	9
Training Schools (Total in Brooklyn, 2)	2	3
Elementary		
Brooklyn (Total No. 230)	82	70
Queens (Total No. 153)	6	7
Manhattan (Total No. 150)	4	2
Other Boroughs (Total No. 146)	3	1
Private and Parochial		
High	16	8
Elementary	16	17
Other Institutions	32	15
Number of potted plants for nature study	1,929	2,943
Number of Petri dishes filled with sterilized agar	5,730	5,482
Total number of teachers supplied with material	6,105	5,708
Total number of pupils reached	257,527	223,801
Living Plants Placed in School Rooms		
No. of schools	69	98
No. of plants	740	689
No. of teachers involved	891	1,703
No. of pupils reached	35,984	80,392
Plants Distributed (Raised in Classes)	27,520	20,515
No. of teachers taking plants	290	671
No. of children taking plants	983	915
Total number of schools represented	154	168
Seed Packets for Children		
No. of schools	549	352
No. of teachers	5,560	6,547
No. of pupils	223,397	261,871
No. of packets	670,202	786,393
Exhibits Provided		
No. of exhibits	17	8
Viewed by	40,845	52,150

reading even the most beautifully illustrated book, and thus to help lay the foundations for a more effective educative process in the classroom of the school.

Incidentally, it may be noted that in 1932 teachers brought more than 41,000 pupils from schools located in all five boroughs of Greater New York City. No pains are spared to make these visits as profitable, educationally, as possible. Of the personnel budget required for this work approximately 40 per cent. was provided from the private funds of the Garden, and 60 per cent. from the annual Tax Budget appropriation.

Research during 1932

A former Secretary of War, Newton D. Baker, in a recent magazine article, raises the question, "as to whether the social return for the expenditures necessary to make college education available justifies the cost"; but he continues: "Nobody has any doubt that the extension of knowledge by men with pioneering minds justifies any outlay necessary to produce and equip fruitful research scholars."

This statement is a truism in educational and scientific circles. It is quoted here because it not only states the attitude of the Brooklyn Botanic Garden from its beginning, but reflects what has come to be the general attitude of the more intelligent portion of the public. This is in contrast to the condition some thirty years ago when the attitude was largely one of indifference, if not of positive opposition.[1] Perhaps the Great War did more than any other single influence to bring about a general realization of the practical value of scientific research in relation to the problems of daily living. Now there is wide recognition of the importance of research primarily for the purpose of extending the boundaries of knowledge and liberalizing the mind. The research program at the Botanic Garden has both theoretical and applied aspects.

[1] The late Dr. William A. Henry (deceased November 24, 1932), in the 1880's, secured from the legislature of Wisconsin the first definite state appropriation for research at the State University—for investigations on the ensilage of fodders and the manufacture of cane-sugar from sorghum cane. "Henry later delighted in telling how one of the legislative leaders leaned across the aisle when the appropriation was under discussion, and remarked to his boon companion, 'Let's kill this pup before it gets to be a dog'."

The progress of the work during 1932 is briefly recorded on pages 53–57.

Registered Research Students

Eight research students have been registered during the year, as compared to six in 1931. Much of the work is being done by candidates for degrees, in accordance with our cooperative agreements with universities located in Greater New York. A list of those registered is given on page 66. This work is in general charge of Dr. Reed, curator of plant pathology.

The Library

The accompanying report on the Library (p. 82) records the accession during the year of 676 books, 747 pamphlets, and 5496 parts of publications—a total of 6919. The number of users for the year has exceeded 3600.

Needs.—Special attention is called to the librarian's statement that there are on hand at least 2000 volumes of serials and periodicals needing to be bound, in addition to many paper covered volumes that should be bound and numerous volumes which need to be rebound. What with more than 900 unbound periodicals being accessioned each year, many with two to four volumes a year, the number of volumes to be bound exceeds 1000 annually. There should be a permanent fund yielding an income sufficient to cover this need.

The library report also notes the unusual bargains in old and rare but very essential books that are being offered in the current book-lists of dealers. It seems a pity that we are not in a position to take a larger advantage of these offers. The numerous private libraries that are now coming into the market contain runs of important serials and many other scarce items at bargain prices. The present endowment of the library is only $23,917, yielding an income (in 1932) of only $1315.

It is a matter of sincere regret that the librarian, Mr. Foss, has been absent on account of illness from August 1 to December 31. It is earnestly hoped that he may be able to resume his duties during the fore part of 1933. During his absence the library assistant, Mrs. Chichester, has been in charge.

The Herbarium

Phanerogamic Herbarium.—A total of 7423 specimens have been mounted and incorporated in the general collection during 1932, as against 11,931 in 1931. As last year, this work, under the supervision of Dr. Svenson, has been made possible by nine assistants assigned to the Botanic Garden by the Emergency Work Bureau (see p. 45), in addition to the two regular herbarium assistants.

Cryptogamic Herbarium.—The curator reports a total of 1445 accessions (1295 fungi; 150 other cryptogams).

Limitations of Space.—Both the Phanerogamic and the Cryptogamic collections have outgrown the space originally assigned to the Herbaria when our building was planned, and their steady growth has created a "housing" problem difficult to solve. The Cryptogamic Herbarium, in particular, is in very cramped quarters, and there seems to be no additional room-space for its expansion. During the year it has been necessary to place some of the cases in the corridor on the lower floor.

Personnel Needs.—Herbarium work includes collecting and mounting specimens, labeling, remounting, cleaning, filing, keeping records, fumigating, typing, and other operations essential to maintaining the collection in a good state of physical up-keep and serving the need of users. The fact that we have kept from six to nine assistants, in addition to two regular assistants, profitably occupied for two years shows how greatly the herbarium has hitherto been undermanned. The curator in charge states that four assistants, in addition to the two now provided for in the budget, could be kept permanently profitably occupied, and are really needed to maintain the herbarium as an active working collection.

Cooperation

In addition to our continuing cooperation with schools of all grades, and with three outside organizations in the publication of three botanical journals (see p. 142), the Garden has cooperated, among others, with the following institutions and organizations during the year:

New Jersey Agricultural Experiment Station.—In cooperation

with the Extension Division of this Station, Mr. Free has given nine addresses before Garden Institutes in various counties in New Jersey, and nine Radio talks from station WOR for the Radio Garden Club of the New Jersey Agricultural Experiment Station.

American Iris Society, in continuation of the Beardless Iris test garden and studies.

Horticultural Society of New York.—In March we stocked the Wardian Case in the Society's library and maintained the plants during the spring. An "Award of Merit" and a "Cultural Certificate," received from the society for exhibits at their monthly meetings, are recorded by the Horticulturist on page 106.

American Rose Society.—Mr. Free broadcast on March 15 over WJZ, in cooperation with this Society, on the subject, "Pruning Roses."

Canal Zone Experiment Gardens (Panama).—In April we supplied to these Gardens tubers of our East Indian Lotus (*Nelumbium speciosum*) for propagating.

Arthur Hoyt Scott Horticultural Foundation, Swarthmore College.—Early in May we supplied to this Foundation, for its *Arboretum*, plants of eight species for which they had made a request.

Blythedale Home for Convalescent Crippled Children.—In response to an appeal from Mrs. M. S. Weil, White Plains, N. Y., we sent about 200 packets of our Penny Packet Seeds to this Home, at Valhalla, N. Y.

Brooklyn State Hospital.—On May 27 we supplied full information as to the method of treatment of swampy areas in order to eliminate mosquitoes, to Dr. George W. Mills, superintendent of the Brooklyn State Hospital, Creedmore Division, Creedmore, Long Island.

Brooklyn Home for Consumptives.—This year, as previously, the Garden, through the department of elementary instruction, is supervising the children's gardens of this institution.

National Educational Association.—An exhibit illustrating our educational work with children was installed at the N. E. A. annual convention at Atlantic City, June 25–30. Miss Shaw, curator of elementary instruction, appeared twice on the program, and was elected President of the Department of Science Instruction.

Brooklyn Bureau of Charities.—On the evening of October 14 the Family Service Department of the Bureau held exercises at the Garden for the awarding of prizes for gardens conducted by the unemployed under the auspices of the Bureau. Miss Jenkins, of our department of elementary instruction, visited about 40 of these gardens as judge. Ribbons for first and second prizes were awarded by our Woman's Auxiliary, and the Botanic Garden gave a potted fern to each contestant. These ferns were raised in our educational greenhouses. The Brooklyn Branch of the Plant, Flower, and Fruit Guild has also cooperated and furnished one of the judges.

Federated Garden Clubs of Ohio.—In May the Garden loaned to the Federated Garden Clubs of Ohio a number of our water-colors and prints of Japanese Iris for an exhibition, held at Closson's Galleries, Cincinnati. There was an account of this in the Cincinnati *Inquirer* of May 29.

New York Association of Biology Teachers.—On the evening of November 14 a special exhibit of educational material and demonstrations of research work in progress was held in the Laboratory Building, in cooperation with the Biology Teachers Association and the Torrey Botanical Club. In connection with the exhibit an address was given by the director on "The Foundational Literature of Botany," illustrated with incunabula, pre-Linnaean books, and other early or epoch-making works, from the Garden library.

Department of Botany of the Brooklyn Institute of Arts and Sciences.—The annual fall meeting of this organization, under the presidency of Dr. George C. Wood, was held at the Laboratory Building on the evening of October 18. An illustrated address was given by Dr. Elmer D. Merrill, director, New York Botanical Garden, on the subject, "The Origin of Cultivated Plants in Their Relation to the Origin of Civilization."

Third International Congress of Eugenics.—The Garden participated in the large educational exhibit held at the American Museum of Natural History during the period of this Congress, and continued from August 22 to September 22.

Sixth International Congress of Genetics

Dr. George M. Reed attended the meeting of the Sixth International Congress of Genetics at Ithaca, New York, held from August 24th to 31st. He read a paper before one of the sectional meetings on "Inheritance of Resistance to Loose and Covered Smuts in Hybrids between Certain Susceptible Oat Varieties and Black Mesdag." He also prepared an exhibit of oat and sorghum materials. The oat exhibit included Riker mounts of the parents, first and second generations of hybrids of Gothland × Victor and also of Hull-less × Black Mesdag. Several charts were prepared giving data on the inheritance of smut resistance in various oat crosses. Photographs and specimens of the oat smut were also exhibited.

The sorghum exhibit included a demonstration of the method of detecting hybrid seedlings by means of their color. There was also a demonstration of the inheritance of the color of the coleoptile in certain sorghum crosses. Special mounts showing the inheritance of panicle and grain character of different crosses were made. There were also some charts giving data on the inheritance of seedling color and also the inheritance of smut resistance.

The director served on the Committee for the entertainment of foreign delegates in New York City, August 20–23.

Cooperation with Relief Agencies

The Mayor's Official Committee for the Relief of the Unemployed and Needy.—Our cooperation with this Committee, noted in the preceding annual report, has been continued throughout 1932 on the same basis. Employees of the various City Departments contributed one per cent. or more of their salaries during the year and the fund thus raised, together with other donations from private sources, was distributed by the Mayor's Committee to provide work and wages for those unemployed on account of the general depression. Employees of the Garden voluntarily assessed themselves one per cent. of their salaries or partial salaries received from the Tax Budget. As last year, it was arranged that this fund be applied to per diem labor at the Garden, thus prolonging the period of employment.

Considering that many of those participating in this plan also

contributed through other channels or met assessments for the same purpose in fraternal organizations, the contributions to the Garden fund were notably generous. The total amount raised was $1,236.06, all of which has been disbursed for per diem labor.

Emergency Work and Relief Bureau.—This Bureau is the distributing agency for the Emergency Unemployment Relief Committee, which has no official connection with any department of government. By this organization 102 temporary employees (71 men and 31 women) have been assigned at the Garden in various capacities during the year. As last year, the indoor people (2 men and 21 women) worked five days a week at $3 a day, and the men outdoors three days a week at $5 a day. The outdoor work included only unskilled labor as none of the men assigned were trained gardeners. The indoor employment, as last year, included herbarium, library, office, and general curatorial assistance.

Since some of the daily papers have referred to those assigned by the Relief Bureau as engaged in "made" jobs, it should be noted that such has not been the case at the Botanic Garden. Every person assigned has been doing work that has needed to be done for several yeas, but has had to be postponed because funds (in many cases frequently requested) had never been appropriated.

Brooklyn Bureau of Charities.—It is the policy and practice of this organization to provide work, whenever practicable, for those who apply to it for aid. During the year the Bureau has assigned 41 men to the Botanic Garden, a total of 3267 man-days, maintaining a payroll averaging $250.73 a week. By this admirable plan "charity" becomes compensation for services rendered.

Association for Improving the Condition of the Poor.—This organization has maintained one man for 3 days a week for 52 weeks, a total of 156 man-days.

It has been a pleasure for the Garden to cooperate with these various agencies for relief. It should be again noted (as last year) that the profitable employment of so many, in addition to our regular force, emphasizes how greatly our normal personnel is, in numbers, below our urgent needs.

Membership

At a time when most organizations and institutions are reporting a net loss in membership it is gratifying to be able to report the enrollment of 222 new members. This, minus 125 resigned, gave a net gain for 1932 of 97, an increase of 9.3 per cent. This is due in largest measure to the untiring and efficient efforts of the Membership Committee of our Woman's Auxiliary, under the chairmanship of Mrs. Henry J. Davenport. The work was in immediate charge of Mrs. Whitney Merrill. The total number of members of all classes enrolled at the end of the year was 1262, as against 1165 at the close of 1931.

Why Join the Botanic Garden?—One may derive certain definite personal benefits from membership in such an institution as a botanic garden or a museum; it is a reservoir from which each may draw. But an additional, compelling reason for becoming a member is because membership affords an opportunity to contribute to the social resources without which trade, commerce, cities, society itself could never be at all.

A botanic garden functions as a social resource in three ways: by extending human knowledge; by disseminating knowledge; by providing a bit of the country in the midst of the city—a place of beauty, of quiet and education, and of refreshment of body and spirit. How essential that its equipment and administration be as perfect as possible. In the business world it is a maxim that plant and processes must approach perfection.

Efficiency is equally important in the cohesive social resources which make society possible. Inefficient schools, museums, and botanic gardens are almost worse than none, for the lesson they teach is that everything else is relatively less important than buying and selling.

What a wonderful thing it would be if the Brooklyn Botanic Garden were provided with resources adequate to insure the conduct of its scientific and educational work with the efficiency of a modern factory, and the maintenance of its grounds with the perfection of beauty which characterises many private gardens where expense has never been spared. The importance for public education of a garden so maintained cannot be overestimated. There is at present no botanic garden in the United States where

such an ideal can even be approximated. At present only one citizen of Brooklyn in every two thousand two hundred is a member—(1200 members with a population of 2,600,000). Such a population should yield more than that number of members.

The eighth annual distribution of surplus propagating material (bulbs, tubers, and seeds) to members increases in popularity each year. On May 23 287 members applied for plants. Each member was supplied with propagating material for ten plants, a total of 2870.

The enrollment of members in classes tends to increase each year. Members enjoy free tuition in some courses and reduced rates in others.

Flower Days.—Four Flower Days were held for members and their friends—three in the spring and one in the fall.

The conditions and privileges of membership are stated in detail on the fly-leaves preceding this report.

Eighteenth Annual Spring Inspection

The Eighteenth Annual Spring Inspection was held on Tuesday, May 10. In the tour of the grounds the special points of interest were the newly planted Laboratory Plaza, the Meridian Panel, the Japanese Garden and Cherry Walk, the glacial boulders with descriptive tablets, and other minor points.

The following exhibits were on view in the Laboratory Building:

1. *Illustrations of Orchids,* in line and color, by Mr. Carl T. Ramsey. The illustrations included terrestrial and epiphytic orchids from both hemispheres. The line drawings showed details of structure of roots and flowers, with special attention to the marvelous mechanisms by which orchids are cross-pollinated by insects. The water colors showed habitat settings chiefly. For the loan and installation of these unusual illustrations the Botanic Garden is indebted to the generous cooperation of Mr. Ramsey.

2. *Eighteen Water Color Illustrations* of modern garden flowers and vegetables, after the style of the old Herbals, by Miss Louise B. Mansfield. These were reproduced in *House and Garden* and *The Country Home* during 1931 and 1932. In the Library, some

of the old Herbals were exhibited to show this early type of botanical illustrations.

3. *Thirty Pencil Drawings* of culinary and medicinal herbs, also by Miss Mansfield, who is one of the Botanic Garden artists.

4. *Studies of Western Trees.*—Twenty-four photographs by Miss Margaret McKenny, author of "Mushrooms of Field and Wood."

The weather was favorable, and the attendance was about 800. The tea, as usual, was in charge of the Woman's Auxiliary, Mrs. Glentworth R. Butler, chairman, Miss Elise Stutzer, chairman of the social committee.

Exhibits

Besides the exhibit held at the Spring Inspection, 17 other exhibits have been held, at the Garden or elsewhere. These are recorded in the report of the curator of elementary instruction on page 81.

Woman's Auxiliary

In addition to having charge of the social part of the Spring Inspection, the Woman's Auxiliary continued throughout the year its splendid work in bringing the opportunities offered by the Garden to the attention of garden clubs and other organizations in Greater New York, and elsewhere on Long Island, and other suburban localities. The following quotation is from a report submitted by the Woman's Auxiliary to the Botanic Garden Governing Committee.

"The work has been carried on by a Membership Committee of the Auxiliary, with Mrs. Henry J. Davenport as Chairman and Mrs. Whitney Merrill as paid secretary.

"In connection with this work nineteen organizations of women were invited to the Garden and entertained with a program which included an illustrated talk about the work of the Garden. More than 3900 letters, invitations, circulars, etc., have been mailed through the secretary. Mrs. Merrill gave talks and conferences on the work of the Garden before fourteen civic, church, and garden club gatherings, telling of membership privileges. Five courses of instruction suggested by the membership activity have been offered."

This work of the Auxiliary was by far the largest factor in securing the net increase of 97 in the Garden membership, recorded elsewhere in this report. In addition, several contributions of funds were secured.

The director wishes to record his great appreciation of this enthusiastic and successful service, which has not only added to the number of members, but also to the number of friends intelligently interested in the Garden; it has made the work of the Garden better known and appreciated throughout the local area. The results are most highly gratifying in view of the prevailing economic situation, and are evidence of the enthusiasm and loyalty of the Auxiliary members as well as of the ability with which the work was planned and carried out. But for this work, the Garden would have joined the ranks of the great majority of similar organizations and institutions and closed the year with a net loss of membership.

Resignation of Mrs. Butler.—At a meeting of the Auxiliary held at the Garden on November 19 the resignation of Mrs. Glentworth R. Butler as chairman was presented. At the same meeting Mrs. Butler was elected Honorary Chairman of the Auxiliary. In accepting the resignation the Auxiliary expressed its regret and its deep appreciation of all that Mrs. Butler has done for the Auxiliary and for the Garden during her seven years as chairman (1926–1932). As a result of her personal efforts public interest in and support of the Garden have increased, and contributions of funds amounting to several thousand dollars have been secured.

At a meeting of the Governing Committee on November 22 the director was requested to prepare and send to Mrs. Butler a letter expressing the Committee's deep appreciation of her services to the Botanic Garden. The director would like to record here on behalf of himself and the staff, grateful recognition of Mrs. Butler's substantial and loyal services.

Mrs. Charles E. Perkins was elected chairman to succeed Mrs. Butler.

Changes in Personnel

On September 28 we were notified by the office of Mr. Alfred W. Jenkins, that Mr. Jenkins had died on the same day at Vichy, France. He had been a member of the Botanic Garden Govern-

ing Committee since April, 1929. Mr. Jenkins's gifts of two stone bridges and one timber bridge over the Brook, ten artificial stone garden seats (five on each side of the Esplanade), and the fountain in the Conservatory Plaza contributed greatly toward the beauty of the Garden, and the bridges and seats met important practical needs. The Botanic Garden was included in the resolutions on Mr. Jenkins's death adopted by the Board of Trustees. In his will the Brooklyn Botanic Garden was made a beneficiary in the sum of Five Thousand Dollars.

There were no other changes in Botanic Garden personnel in 1932.

Gifts

More than 300 gifts have been received during the year. They are acknowledged with the thanks of the Botanic Garden Governing Committee and the director. Their intrinsic value is enhanced by the interest and confidence in our work of which they are evidence. A full list may be found on pages 119–128. Special attention is called to the following:

January 10. Mr. Edward C. Blum, $150 for the bronze tablets affixed to 28 glacial boulders in the Garden.

February 1. Mr. Joseph Goodman, $135; $100 for an annual cup for our children's work for ten years, and $35 for roses and a marker in the Children's Garden.

February 1. Miss Frances E. White and Miss Harriet H. White, $500 each, for the maintenance of the Japanese Garden.

March 17. The Conard-Pyle Co., West Grove, Pa., 39 roses in 10 varieties for the Rose Garden.

April 15. Mr. W. A. Manda, South Orange, N. J., 63 species and varieties of cacti.

May 2. Jackson & Perkins Co., Newark, N. J., 35 moss roses in 35 varieties.

June 16. William Tricker, Inc., Saddle River, N. J., 19 tender water-lilies in 19 species and varieties.

July 1. Mrs. Margaret Morgan, Shoreham, L. I., $150 for salaries in the department of elementary instruction.

Financial

Considering the present economic condition of the entire world, it is gratifying to be able to report that the Botanic Garden closed

the year without a deficit, with $11,418.36 added to its permanent funds, and with the following year's budget balanced. This, of course has been made possible only by the most rigid economies. So far (December 31, 1932) it has not been necessary to reduce any salaries. It has, however, been announced that the Tax Budget of the City will be reopened in January, 1933 (by special act of the State Legislature). In that case it is likely that the salary and wage appropriations will be reduced.

The City and the Garden

The Tax Budget appropriation for maintenance of the Garden in 1932 was as follows:

	Requested	Granted	Change from 1931
Personal service	$126,954	$82,660	No change
Other codes	24,855	16,465	$2,275 (Decrease)
Total	$151,809	$99,125	$2,275 (Decrease)

The Private Funds Budget was $99,580.35, as against $110,-346.43 in 1931, a decrease of $10,766.08. The Private funds budget was $455.35 in excess of the Tax Budget. The percentages of the two budgets for the past five years is as follows:

	1928	1929	1930	1931	1932
Tax budget	48%	43%	44%	48%	50%
Private funds	52%	57%	56%	52%	50%

Collections Fund Contributions

Considering the times, the response to the Collections Fund solicitation was very encouraging, being only $611 less than a year ago ($6151 vs. $6762). The Garden is dependent on this fund for the purchase of all living plants and herbarium specimens, in part for the purchase of books, and for various miscellaneous purposes in connection with our scientific and educational work.

The amounts contributed during the past six years are as follows:

	1927	1928	1929	1930	1931	1932
Within the Board	$2,350	$1,925	$1,850	$ 935	$1,175	$ 600
Without the Board	7,532	5,495	5,432	5,604	5,587	5,557
	$9,882	$7,420	$7,282	$6,539	$6,762	$6,157

Endowment

The need of scientific and educational institutions for permanent endowment funds, conservatively invested, has been greatly emphasized by the world-wide economic conditions which now prevail. As noted in my Report for 1930, it has only recently been argued that the effect of permanent endowment on institutions is likely to be unfortunate in one way or another, and that, anyway, each generation should meet the current needs of such institutions and will, indeed, do so if the work of the institution demonstrates that it is worthy of support. The gradual falling off of the contributions to our Collections Fund from $9,882 in 1927 to $6,157 in 1932, in the face of generally recognized and increased need of the Garden's services, illustrates the importance of an institution being assured of an annual income that does not greatly fluctuate with the ups and downs of the market—with general prosperity and the periodic variations of the ability of people to give. Perhaps it will not seem inappropriate for these reports, each year, to urge the need of additional endowment for the Garden until that need is met. The income from one million dollars of additional endowment at 5½ per cent., added to the present private funds income, will provide for the enrichment and expansion of our work for some time to come. It is an urgent need. Certain it is that the Garden cannot continue to function effectively without a substantial increase in its annual budget. This should be guaranteed by the income from permanent endowment.

Appended Reports

In the reports on research for 1932, the administrative departmental reports, and Appendices 1–7, which follow this report, may be found detailed information of importance for those who are interested in the development and progress of the Garden.

Respectfully submitted,

C. Stuart Gager,
Director.

REPORTS ON RESEARCH FOR 1932

Plant Pathology

By George M. Reed

Studies on the Inheritance of Resistance of Oat Hybrids to Loose and Covered Smut

During the past year many third and fourth generation progenies of several different oat crosses were studied. The third generation progenies were grown from second generation plants which had not been inoculated and, consequently, no susceptible second generation plants had been eliminated. Usually, there were two sets of seed of each progeny, one set being inoculated with the loose smut and the other with the covered. In this way, the behavior of the different progenies to both of the smuts was determined. Altogether, third generation progenies from 15 oat hybrids were grown. These different hybrids involve quite distinct types of combinations of smut resistance.

There were 88 F_3 progenies of Hybrid 16, Gothland $\times$ Victor, inoculated with the covered smut, and 32 of these were classified as resistant, no infected plants being observed, 44 segregating, the percentage of infection being less than 50, and 12 susceptible, a few actually giving 100 per cent. infection. The Gothland parent, as usual, gave negative results with the covered smut, while Victor was practically 100 per cent. infected. There were 28 third generation progenies of this hybrid inoculated with the loose smut and, out of a total of 633 plants inoculated, 603 (95.2 per cent.) were infected. Since both varieties are very susceptible to the loose smut, the results obtained with the third generation progenies are in harmony with the behavior of the two parents.

Hybrid 18, Silvermine $\times$ Black Mesdag, and Hybrids 34, 35 and 36, Early Champion $\times$ Black Mesdag, involve a similar combination of resistance in the parents. Silvermine and Early Champion are very susceptible to both loose and covered smut, while Black Mesdag is resistant.

There were 40 F_3 progenies of Hybrid 18 inoculated with the loose smut and of these 15 were resistant, 18 segregating, and 7

susceptible. In the corresponding series with the covered smut there were 42 F_3 progenies, and 15 were classified as resistant, 21 segregating, and 6 susceptible.

There were 71 F_3 progenies of Hybrids 34, 35, and 36 inoculated with the loose smut, 17 being resistant, 31 segregating, and 23 susceptible. In the corresponding series with the covered smut there were 72 progenies, of which 21 were resistant, 40 segregating, and 11 susceptible.

In all of these hybrids there was a remarkable uniformity in the behavior of the different progenies to the two smuts. If a progeny was resistant to one, it was resistant to the other, or if it was susceptible to one, it was susceptible to the other. There were a few departures from this general statement, but the correspondence in behavior is quite noteworthy. The results with the progenies of these different hybrids are in line with what have previously been obtained. Additional tests, however, will be made with the progenies which showed a different behavior toward loose and covered smut.

A large number of fourth generation progenies of Hybrids 17, and 18, Silvermine × Black Mesdag, and Hybrids 33, 34, 35, and 36, Early Champion × Black Mesdag, were grown. All of these were chosen primarily on the basis of having proved to be resistant to both smuts in the third generation, and usually to one of the smuts in the second generation. All of the 286 fourth generation progenies grown were, with five exceptions, pure resistants, there being a total of 65 progenies of Hybrid 17, 64 of Hybrid 18, 58 of Hybrid 33, 59 of Hybrid 34, 30 of Hybrid 35, and 10 of Hybrid 36. The five exceptions were grown from different F_3 plants descended from the same second generation plant of Hybrid 36. Four of these progenies gave less than 50 per cent. infection and one more than 50 per cent., there being a close correspondence in their reaction to the two smuts. A possible explanation of the behavior of this one group of fourth generation progenies is that the F_2 and F_3 generations were not pure resistants, but chance escapes. It is noteworthy, however, that only one such case of this sort appeared.

Hybrids 29, 30, 31, and 32, Fulghum × Black Mesdag, involve a different combination of smut resistance. There were 98 third

generation progenies of these hybrids grown. They were all inoculated with *Ustilago Avenae*—Fulghum, a smut which severely attacks one of the parents—Fulghum—but does not infect the other—Black Mesdag. Of these 98 progenies, 27 were resistant, 47 segregating, and 24 susceptible.

Third generation progenies of the following hybrids were also grown: Hybrid 50, Canadian × Markton, Hybrid 51, Early Champion × Markton, Hybrid 53, Victor × Markton, Hybrid 56, Gothland × Markton, Hybrid 60, Monarch × Markton, Hybrid 62, Scottish Chief × Victor, Hybrid 63, Gothland × Monarch, Hybrid 65, Danish × Monarch, Hybrid 66, Danish Island × Monarch, Hybrid 67, Orientalis × Monarch, and Hybrid 68, Monarch × Scottish Chief. In the series with loose smut, there was a total of 560 progenies and in the corresponding series with covered smut there was a total of 618 progenies.

There were a few fourth generation progenies of some of these same hybrids. Much additional material of these will be available for the coming year.

During the past year, the extensive data previously obtained with Hybrid 16, Gothland × Victor, were published; the results for the second, third, and fourth generations were included. The extensive data secured on the inheritance of resistance to loose and covered smut in hybrids of Hull-less and Gothland and Monarch oats were also published.

The first generation plants of several new oat crosses were grown, and the second generation of these hybrids will be available for study during the coming year. A few additional crosses involving still further combinations of smut resistance were made.

Physiologic Races of Oat Smuts

Much additional work was done in determining the characteristics of some of the oat smut races. Several new collections of both loose and covered smuts were available for comparison. The data secured indicate definitely the existence of still further additional races of both smuts. There is distinct evidence also that the loose smut which occurs on Fulghum oats is differentiated into more than one race; distinct specialized races can be separated out by the use of suitable varieties.

Studies were made on the influence of temperature on the infection of oat varieties by a number of the different races. In general, the maximum percentage of infection occurs in all of them at about 20° C. In most cases, no infection, or very little, occurs when the plants are germinated at a temperature of 30° C. One race of covered smut, however, gave comparatively high percentages of infection when seeds were germinated at the latter temperature. Thus there is evidence that there are variations in the temperature relations for infection by the different oat smut races.

Additional experiments were carried out on the influence of environal factors on the appearance of smut in susceptible varieties. In all of these cases, seedlings were germinated under conditions most favorable for infection. After germination, the plants were then subjected to quite different conditions, which influenced profoundly the rate and amount of their growth. So far as our studies have gone, however, such differences in the subsequent development of the plants have not in any way appreciably influenced the percentage of infected plants.

Cultural Characteristics of the Oat Smuts

Mr. L. Gordon Utter has continued his studies on the cultural characteristics of the different races of loose and covered smut. Most of the races have been grown in culture, and their behavior over variable periods of time has been determined. He is continuing his studies in order to determine whether constant differences exist in the characteristics of these races as grown in artificial media in the laboratory. Inoculation experiments are also being carried out with the pure cultures obtained.

Bunt of Wheat

Some experiments were carried out with the different races of bunt of wheat which have been previously described. For the most part, the work has been concerned with the temperature relations for infection. So far as determined, the various races correspond quite closely in their response to different temperature conditions. There are, however, a number of lines for further experimentation.

Sorghum Smuts

Miss D. Elizabeth Marcy has continued the studies on the inheritance of resistance to loose and covered smuts of sorghum. During the past year, the second generation plants of 15 different sorghum hybrids were grown. These hybrids represented crosses involving parents which differed in various ways in their reaction to loose and covered smut. Usually, two sets of F_2 plants of each hybrid were grown, one set being inoculated with the loose smut and the other set with the covered smut. On the average, there were more than 100 plants grown in each series. The parental varieties were also included for comparison.

An extensive series of third generation progenies of Hybrids 1–A and 1–B, Feterita × Sumac Sorgo, was grown. There were two sets of 38 F_3 progenies of Hybrid 1–A, one set being inoculated with loose smut and the other with the covered. There were 36 F_3 progenies of Hybrid 1–B grown, having been inoculated with the covered smut. A detailed study of the inheritance of resistance to the smuts in relation to the inheritance of the red color of the seedling and the juicy or pithy character of the stem was made. Feterita is characterized by pithy stems, in contrast to the sweet sorghum type of the Sumac Sorgo.

Forest Pathology

By Arthur Harmount Graves

Work on Japanese-American Hybrids During 1932

Continuing the account of the 124 hybrid Japanese-American chestnuts secured by cross pollination in 1931, described in my report for 1931 in the Brooklyn Botanic Garden Record (Vol. 21, pp. 46–53), these nuts, with a few exceptions, were planted immediately after harvesting, in (1) sandy soil procured from woods at Oyster Bay, L. I., where native chestnut was formerly abundant, (2) in garden loam, and (3) in gravel. One hundred nuts germinated, or about 80 per cent., which is considerably higher than the figure (68 per cent.) given by Professor Toumey [1] for the germination of the chestnut. The accom-

[1] Toumey, J. W. *Seeding and Planting in the Practice of Forestry.* N. Y., 1916, p. 122.

panying table shows the number planted in each medium, the number germinated, and the per cent. of germination. The garden loam is evidently not as good a medium as the others, possibly on account of its well-known tendency to start rotting. All the percentages, however, are higher than those given by Toumey.

TABLE III. GERMINATION OF JAPANESE-AMERICAN HYBRID CHESTNUT

Kind of Soil	No. Planted	No. Germinated	Per cent. of Germination
Long Island Soil	52	44	84.6
Garden loam	42	30	71.4
Gravel	30	26	86.6

There is another factor which may have been operative in the relative viability of the nuts, namely their difference in parentage. The following table shows the germination percentage of the different hybrids, as well as their subsequent history to October 1, 1932.

TABLE IV. RECORD OF JAPANESE-AMERICAN CHESTNUT HYBRIDS AND CHECKS: 1932

Owner of Japanese Parent	No. of Nuts Planted	No. Germinated	Per cent. of Germination	No. Living Oct. 1, 1932	Max. Height in Inches Oct. 1	Min. Height in Inches Oct. 1	Average Height in Inches Oct. 1
Winthrop	5	5	100	5	15	7	10.4
Folk	14	6	42.8	2	12	12	12
Hammond	10	4	40	4	36	6	19.25
Minturn	1	1	100	0	0	0	0
Smith	92	81	88	61	20	3	10.1
			Checks, 1932				
Folk Jap.	7	4	57.1	2	15	6	10.5
Hammond Jap.	11	2	1.8	2	10	8	9
Minturn	1	1	100	1	–	–	15
Smith	15	10	66.6	6	16	4	7.5
"Italian" chestnuts	15	10	66.6	11 [1]	28	2	12.1
American chestnuts (Thomson).				7	10	4	7.7

[1] One nut had two embryos.

FIG. 5. Japanese chestnut (*Castanea crenata*) on place of Mr. Renville S. Smith, Oyster Bay, Long Island, showing bags protecting from pollen of their own tree the inflorescences that have been artificially pollinated.

Although the number of nuts is in most cases too small to justify much faith in the dependability of the results, it would appear that the viability of the Smith and Winthrop hybrids is much superior to that of the Folk and Hammond nuts. As was stated last year, the only nuts secured from the Winthrop tree were those which resulted from our cross pollinations. Otherwise the tree was absolutely barren. The same thing happened the year before, and is certainly good evidence that the nuts secured were actually hybrids.

In the above table we have also, under the heading "checks" assembled the performances of ordinary nuts (not hybrids) which were collected from the Japanese parents and from other sources. Those labelled "Italian chestnuts" were bought under this name in a Brooklyn market on October 16, 1931, and were the large nuts one sees in the markets at this time of year. They had been imported from Europe—probably southern Europe—perhaps either from Italy or the Balkan peninsula, and are apparently a variety of *Castanea sativa*. Their germination and growth have been very satisfactory, one having double embryos, several attaining a growth of nearly two feet, and one a height of 28 inches, with a stem ½ inch thick at the base. Besides these, several nuts of the American chestnut were sent us by Mr. J. Stuart Thomson of Jersey City, collected by him from possibly resistant trees in various parts of the United States.

The height growth of the seedlings might be expected to prognosticate in some measure what will be the size of the mature tree. Toumey gives the average height of a one-year-old American chestnut to be 10–16 inches.[1] Most of the seedlings are within these limits. A notable exception is the case of the Hammond hybrids, averaging 19.25 inches in height for the year. One of these is most remarkable, having made a growth of nearly three feet during the year. What happened was an unfolding of two terminal or winter buds during the season, so that in addition to the growth from the embryo, two extra seasons of growth were added. This seedling seems to possess the proverbial virility of hybrids.

[1] The figures actually given (l. c., p. 302) are 10–6 inches, but the "6" is evidently a misprint for "16" since in all other cases in the table the figures *ascend*.

All of the seedlings of the above table were planted out by the writer in May on his land at Hamden, Connecticut. On account of the extremely dry summer, a considerable number died of drought, so that on October 1, 1932, seventy-two of the 100 were still living. However, all of the Winthrop and all of the Hammond hybrids came through the summer well. This fall each little stem was enclosed in a cylinder of ¼ inch mesh wire netting to protect it from attack by rabbits and field mice during the winter.

Other Plantings During 1932.—In early December, 1931, we received a quantity of nuts of various types of the Japanese chestnut. These had been obtained by Dr. G. M. Reed from Japan, through Mr. Tanaka. Most of these germinated and are now growing well in the nursery north of the Laboratory Building and on my land at Hamden.

Map of Chestnut Plantings.—Including the hybrids, and Japanese and American trees planted there this year, there are now over 200 chestnut seedlings growing on this land, covering an area of about 3½ acres. New land will have to be prepared for the reception this year of the additional hybrids and the seedlings of *Castanea sativa* and *dentata* now growing in our greenhouses. A map showing the location of all these plantings at Hamden is submitted with this report.

Hybridization Work in 1932.—During the summer Miss Rusk and Miss Vilkomerson continued the hybridization work, using only one tree, that of Mr. Renville S. Smith at Oyster Bay, L. I., as the Japanese parent. We would like to take this opportunity to thank Mr. Smith for his continued interest and cordial cooperation. On June 26th and July 2d, 203 branches bearing pistillate flowers were castrated (*i.e.*, stamens removed) and bagged. On June 27th pollen was secured from American chestnut shoots near New Milford, Connecticut, and on July 6th and July 10th more American pollen was collected from native trees near Crafts, New York (not far from Lake Mahopac.) Mr. Smith's Japanese tree is peculiarly late in flowering, being practically synchronous with the American species or even a trifle later. On this account it is especially suitable for hybridizing work. As a rule the Japanese individuals bloom much earlier (sometimes several weeks) than the American.

The accompanying table gives an outline of this hybridization work in 1932. The most important result is, of course, the acquisition of 189 new hybrid nuts, which were planted immediately in our greenhouse, and in some cases, at the present writing, are commencing germination. It will be noticed from the accompanying table that less than ¼ of the pistils were pollinated three times—in fact, some of them were pollinated only once. It would save much time and labor if we knew which pollination was most effective. This next season we hope to carry on experiments looking toward enlightenment on this point.

Japanese-American Chestnut Hybridization Work in 1932

(Only one tree, that of Mr. Renville S. Smith, Oyster Bay, L. I., was used as the Japanese (♀) parent)

Pollination Work:

Branches bagged ..... June 26, (100) [1]; July 2, (103).
1st pollination ..... July 2, (59); 7, (66); 9, (63); 12, (15).
2d Pollination ..... July 7, (9); 9, (43); 12, (121).
3d pollination ..... July 12, (48).

Harvesting and Planting:

Burs bagged ..... September 17: 185.
Nuts collected ..... October 19: 189.
Nuts planted ..... October 24 to 27.

Other chestnuts received and planted during fall of 1932. One species which we have always lacked in our plantings and hybridization work has been the common European chestnut, *Castanea sativa*. One of the objects of my trip to Europe in the summer was to see this tree and arrange if possible for a supply of nuts. Several trees in southern France near Lake Geneva were photographed. Specimens were seen also in northern Italy. Arrangements were made with Drs. Ulbrich and Hochreutiner, and M. Guillaumin, of the Berlin and Geneva Gardens and the Jardin des Plantes respectively, to ship us some of the nuts of this species when ripe in the fall. Thanks to the courtesy and cooperation of these gentlemen we received shipments during the fall, and have planted these nuts in the greenhouses, as follows:

[1] The figures in parentheses refer to the number of bags.

1. From Dr. E. Ulbrich, Berlin-Dahlem Botanischer Garten und Museum, 105 nuts of *Castanea sativa* received and planted December 22, 1932.
2. From Dr. B. P. G. Hochreutiner, Conservatoire Botanique de Genève, 15 nuts, received November 5 and planted November 16. These nuts were collected from the Department of La Haute-Savoie, France.
3. From M. A. Guillaumin, Jardin des Plantes, Paris, 230 nuts received December 10 and planted December 11–15. These nuts came from the Jardin de Jussieu.

In addition to these we received during the fall from Miss Loines a quantity of nuts of the American species from wild trees in Virginia. Some of these have already germinated. Other nuts of the American species received and planted during the fall were from Mr. V. L. Frazee of East Side High School, Paterson, N. J.; Mr. J. Stuart Thomson, Jersey City, N. J.; and Mrs. J. E. Spingarn, New York City. We wish to thank these friends for their interest.

Beardless Iris Project

By George M. Reed

Several important additions to the Beardless iris collection were made during the past year. Mr. S. Tanaka made 29 different collections of iris in different parts of Japan in 1931. The plants were sent to the Yokohama Nursery Company, Ltd., who took care of them until early in the year, when they were forwarded to the Botanic Garden. The collection included wild plants of *Iris Kaempferi.* In addition, *I. laevigata, I. sibirica, I. setosa,* and *I. Rossii* were represented in the collections.

We also obtained 41 varieties of the cultivated Japanese iris from Shuho-yen, Yokohama, Japan. The proprietor of this nursery, Mr. N. Nishida, has been making a specialty of the Kumamoto race of Japanese iris. This group of varieties has been developed in the Western part of Japan, and as yet the varieties have not been widely distributed. We also added to the collection 19 of the newest varieties of the Yokohama Nursery Company, Ltd.

Practically all of the Japanese iris were dug up and reset during

the late summer and fall. The varieties were rearranged on the basis of notes taken during one or more seasons; many corrections in the names of the varieties were made.

A large number of seedlings have been grown. Several different collections of seed were obtained from Japan through Mr. S. Tanaka. Several different crosses involving various iris have been made during the past few years, and many of these bloomed during the past season.

Additional watercolor drawings of varieties and species were made by Miss Louise B. Mansfield. The varieties selected represented different types from the standpoint of color and form.

Systematic Botany

By Alfred Gundersen

The Classification of Dicotyledons

During the past year I have continued studies on relationships of families of dicotyledons, especially as connected with the development of flowers. As the systematic section of the plantations is laid out according to the Engler system, the classification becomes more evident than in a printed form. I have been interested in making comparisons in particular between the Engler, Wettstein, Bessey, and Hutchinson systems, in so far as they relate to the dicotyledons. These systems are alike in numerous respects. I have been occupied with a study of the differences.

Comparisons with which I have been especially concerned are:

Resemblances between families in the orders *Parietales* and *Papaverales*.

Resemblances between *Caryophyllales* and *Primulales*.

The systematic position of the somewhat isolated families *Cactaceae* and *Aristolochiaceae*.

Many drawings have been made by Miss Maud Purdy, showing the comparative morphology of the flower buds and adult flowers in these groups. Interesting changes in placentation and other characters relating to the directions of floral evolution have been observed. Some of these studies were presented before the Torrey Botanical Club in March and were published in *Torreya* for December.

Systematic Botany

By H. K. Svenson

Astor Expedition Plants.—Work on the collection of plants of the Astor Expedition to the Galapagos and Cocos Islands (1930) is practically completed. It is expected that the report will be published in the spring of 1933.

Eleocharis.—Progress is being made on monographic studies on the genus *Eleocharis.* Photographs of type-specimens have been received from several botanical institutions (Prague, Berlin, and Paris), and through the courtesy of the National Herbarium, Washington, and the California Academy of Sciences, San Francisco, I have been able to study large representations of the genus from these institutions. Mr. C. C. Deam, State Forester of Indiana, and Mr. J. B. McFarlin, of the University of Michigan, have sent me extensive material from Indiana and Florida, respectively. A second contribution centering on the American species, *Eleocharis capitata,* was published as Brooklyn Botanic Garden *Contributions,* No. 65.

Genetics

By Ralph C. Benedict

Nephrolepis

During the past year three lines of activity have been carried on with the Nephrolepis material. (1) The living plants have been maintained in their several divisions in the Experimental House No. 1, in a special exhibition set in House No. 3, and in the general collection in Houses No. 8 and 9. (2) A special collection of thirty plants was prepared and exhibited at the International Genetics Congress at Ithaca, August 24–31. (3) The photographic material accumulated since the inception of this work at the Botanic Garden was assembled and reorganized and mounted in a special album with copious explanatory legends. This book was also exhibited at the Genetics Congress in Ithaca.

Further, it may be noted that a set of about thirty varieties was sent to Prof. F. E. Lloyd, McGill University, Montreal, Canada.

Graduate Students and Independent Investigators Enrolled During 1932

In addition to the members of the Botanic Garden Staff, eight graduate students and independent investigators were engaged in carrying on botanical research in the laboratories of the Garden.

Mrs. Marie E. Conklin has continued her investigations on the bacteria which form the tubercles on the wild legumes. She has practically completed certain phases of her work, and she plans on utilizing the data as the basis of a Master's thesis at Columbia University.

Mrs. Mary Ellen Peck Churchill continued her studies on the inheritance of certain characters in peas. She grew additional second and third generations in order to determine the mode of inheritance of certain seed characters.

Mr. Charles F. Doney is enrolled at New York University for a Master's degree, taking botany as his major subject. His special problem is concerned with the ornamental shrubs of the Botanic Garden. He is preparing a thesis on the genus *Staphylea*.

Mr. Charles A. Finnegan was enrolled at New York University during the first part of the year. He has undertaken a study of the broadleaved trees of the Botanic Garden.

Mr. Samuel Kaiser, a member of the Staff of the Department of Biology of Brooklyn College, utilized some land in the experimental field for growing peppers. He is engaged on the problem of the inheritance of size and form in the fruits of these plants.

Miss Elva Lawton, an instructor in the Biology Department of Hunter College, continued her investigations on regeneration and polyploidy in ferns.

Miss Mollie Sobel, a teacher of Biology at Abraham Lincoln High School, completed her study of the longevity of the smut spores, and utilized the data as the basis of a thesis for the Master's degree at Columbia University.

Mr. Hans E. Vollert is enrolled at New York University for the degree of Doctor of Philosophy. He is majoring in plant pathology, making a special study of the cultural characteristics of certain smuts. His minor is entomology, with special reference to the thrips on the iris and gladiolus. Mr. Vollert is a graduate of the University of Leipzig, and he also has the equivalent of the degree of Master of Science from that Institution.

REPORT OF THE CURATOR OF PUBLIC INSTRUCTION FOR 1932

DR. C. STUART GAGER, DIRECTOR

Sir: I submit herewith my report for the year ending December 31, 1932.

GARDEN ATTENDANCE A RECORD

The year 1932 saw an increasing number of visitors to the plantations and the conservatories of the Garden. The total registration at all the entrance gates was 1,307,964 (see Table II). This was an increase of more than 200,000 above the total for 1931 (1,107,339) or about 18 per cent.—the largest annual increase

TABLE II

ATTENDANCE AT THE GARDEN DURING 1932

	Jan.	Feb.	Mar.	Apr.	May	June	July
At regular classes	1,264	1,820	3,071	3,121	3,531	2,694	12,680
At visiting classes ...	764	746	3,366	9,932	8,600	3,379	120
At lectures to children	491	526	2,213	8,890	8,500	3,079	100
At lectures to adults ..	25	165	125	285	496	475	0
At conservatories	8,182	5,230	12,478	16,221	19,969	9,342	10,096
At grounds	50,832	71,339	84,480	134,838	232,737	162,960	130,053

	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Totals
At regular classes	10,350	3,146	3,639	2,370	2,800	50,406
At visiting classes	150	137	6,319	5,320	2,178	41,011
At lectures to children .	120	25	4,389	4,769	1,722	34,824
At lectures to adults ...	0	224	421	475	50	2,741
At conservatories	8,636	11,829	9,830	4,906	6,317	123,036
At grounds	82,898	117,629	106,881	80,587	52,730	1,307,964

since 1927. Naturally, the attendance for individual months ran considerably above that of 1931. But the attendance for May, 232,737, was especially noteworthy, being not very much less than that for the whole year of 1916 (314,990), when attendance records first began to be kept.

During the week-end of May 14 and 15 the turnstiles registered 38,304 visitors, a number which far surpassed any previous week-end attendance at the Garden. (The largest previous figure for a week-end, 28,662, was recorded on April 18th and 19th of 1931.) This large week-end attendance is the more remarkable because it occurred after the naturalized flowering bulbs had ceased to be attractive. The chief objects of interest were the bursting of the trees and shrubs into full leaf, the display of lilacs in flower in the Lilac Triangle, the graceful wisterias draping the waterfalls in the Japanese Garden, as well as the Rock Garden, which was then in its most colorful dress.

The attendance at the Conservatories, which showed a large increase in 1931 over former years, increased to 123,036 as against 112,806 of last year.

The combined attendance at the Garden classes and lectures was 128,982—a slight increase over last year's—123,630.

School Service

Requests for study material from schools and other institutions have continued to show a gradual increase. During the year 5730 dishes were filled with nutrient agar for the study of molds and bacteria. Teachers planning to have their classes commence the study of these microorganisms send a supply of clean petri dishes to the Garden, where the dishes are sterilized and filled with nutrient agar. They are then called for by a messenger from the school. The increasing number of dishes filled by the Garden each year is the best testimonial we could offer that this service is needed. At certain periods of the year, particularly during the months of May (1356 dishes) and December (1056 dishes), the demand for this service has become so heavy that Miss Rusk, who has special charge of the work, would have been unable to carry it were it not for the timely assistance of workers from the Emergency Work and Relief Bureau.

Adult Classes and Courses

During the year 1932 the Woman's Auxiliary of the Garden took an active interest in the courses of instruction offered to the public. The first class particularly sponsored by this committee

was one entitled Advanced Gardening, which began October 22, 1931, as already noted in my report for 1931. During 1932 the following courses were especially promoted by the Woman's Auxiliary:

A19. Ornamental Shrubs. Fall Course. Dr. Gundersen.
A20. Advanced Gardening. Mr. Free and Dr. Reed.
A21. Backyard Gardens. Miss Shaw.
A25. Fundamentals of Gardening. Miss Shaw and Mr. Free.
Trees and Shrubs. Special Fall Course. Dr. Graves.

The total registration for all of these courses was 141. During 1932 Mrs. Whitney Merrill, Secretary of the Membership Committee, addressed twenty-nine garden clubs and women's organizations in New York City and vicinity, telling them of the work done by the Brooklyn Botanic Garden and particularly of the courses of instruction offered to the public. Lantern slides showing the Garden activities were used with these talks. I am glad to have this opportunity to thank Mrs. Merrill and the other members of the committee who have so generously devoted a large share of their time and energy to the welfare of the Garden.

The registration for the Saturday afternoon classes in Trees and Shrubs, as in former years, continued to be heavy—65 in the spring and 55 in the fall. With Miss Vilkomerson's assistance we were able to handle the spring class, which was divided into two sections. The fall class was likewise divided, but unfortunately I suffered a severe illness on November 1. During my absence the class was split up into three sections, in charge of Miss Rusk, Miss Vilkomerson, and Mr. C. F. Doney, a student-assistant at the Garden. An additional instructor for this course is urgently needed. The classes of nurses in training continued to be held both in spring and fall, 74 being registered in the spring and 100 in the fall. Three hospitals, Prospect Heights, Kings County, and St. Johns, were represented. During my illness in the fall Dr. Svenson conducted the field work and Miss Rusk the laboratory work.

The total registration in our adult classes for the year 1932 was 780, as against 638 for 1931, and 455 for 1930. It is quite evident that our teaching staff, which is nearly the same numerically as it was ten years ago, is not adequate for thorough instruction of such

large numbers. I would therefore urgently recommend that at least one more instructor be appointed.

Lectures for High School Students

On account of the popularity of these lectures in 1931 they were repeated in 1932, and two new subjects were added. The schedule was as follows:

April 14. Reproduction in the Flowering Plants. Miss Rusk.
April 21. How Plants Get Their Food. Dr. Graves.
April 28. Forestry. Dr. Graves.
May 5. Marine Life. Prof. Martin.
May 12. Economic Plants: The Beverage Plants—Native and Exotic. Prof. Cheney.
May 19. Plant Breeding, New and Old. Prof. Benedict.
May 26. The Growth of the Idea of Evolution. Prof. Benedict.

The total attendance at the seven lectures was 1600, or an average of about 230 pupils for each lecture.

Flower Days

1932 was the fifth consecutive year in which flower "Days" have been celebrated at the Garden. The attendance showed a gratifying increase over that of the previous year. Even at Fall Rose Garden Day, for which Nature provided a pouring rain, thirty people attended. Of course the exercises were held indoors. Specimens of various popular roses (culled from the Rose Garden) were displayed and discussed by the leader, Mr. Free. The schedule for the year, with leaders, was as follows:

Monday, April 18. Daffodil Day. Mr. Leonard Barron, Horticultural Editor of the *American Home*.
Friday, June 3. Iris Day. Dr. George M. Reed, Curator in charge of our Iris project.
Friday, June 10. Rose Garden Day. Mr. Fred D. Osman, Proprietor, the New Brunswick Nurseries, and Vice-president of the American Rose Society; and Mr. Montague Free, Horticulturist, Brooklyn Botanic Garden.
Thursday, October 6. Fall Rose Garden Day. Mr. Montague Free.

The cordial cooperation of Mrs. Glentworth R. Butler, Chairman of the Woman's Auxiliary, and of the various members of

FIG. 6. Motion pictures in color (Koda color) before Public School classes, June 17, 1932. The reel is on the Japanese Garden; the Tea House on the screen. (8428.)

this organization, who took charge of the social part of these events was an essential reason for their success. The assistance of the young ladies of the staff of the Garden is also here gratefully acknowledged.

European Travel

During the summer I visited some of the principal European botanic gardens and parks. About 400 photographs were secured, and lantern slides have been made from many of these. The following places were visited:

England: Royal Botanic Gardens, Kew; Hampton Court Gardens; Chelsea Physic Garden, London; South Kensington Gardens, London; Hyde Park, London; Shakespeare Garden, Stratford-on-Avon; Municipal Garden, Stratford-on-Avon; Oxford Botanic Garden; Gardens of St. John's College, Oxford; Cambridge Botanic Garden.

France: Jardin des Plantes, Paris; Luxembourg Gardens, Paris; Bois de Boulogne, Paris; Bagatelle, Paris; Parc Champs du Mars, Paris; Trocadero, Paris; Etablissement Horticole de Ville, Paris; Roseraie de L'Haÿ, L'Hay-les-Roses; Grand and Petit Trianons, Versailles; L'Arboretum National des Barres et le Fruticetum Vilmorianum, Nogent-sur-Vernisson.

Switzerland: Geneva Botanic Garden; Jardin Anglais, Geneva; Floraire Nurseries, Correvon & Son, Geneva; Glacier Garden, Lucerne.

Italy: Public Gardens, Milan; Public Gardens, Venice; Villa Carlotta, Lake Como; Villa Arconnati, Lake Como.

Austria: Vienna Botanic Garden; Schweizer Garten, Vienna; Schönbrunn Garten, Vienna.

Hungary: Zoological (Botanic) Garden, Budapest; Municipal Rose Garden, St. Margaret's Isle, Budapest.

Germany: Staatlicher Botanischer Garten, Dresden; Grosser Garten, Dresden; Staatlicher Botanischer Garten, Berlin-Dahlem; Rosen Garten, Berlin; Tiergarten, Berlin; Spreewald.

Holland: Amsterdam Botanical Garden.

Editorial Work and Publicity

I continued to serve on the editorial board of the *American Journal of Botany*, as editor of the Plant Section of General Biology for *Biological Abstracts*, as editor of the Brooklyn Botanic Garden *Contributions*, and as associate editor of the *Bulletin* of the Torrey Botanical Club. As editor of the Brooklyn Botanic

Garden *Leaflets* I report that, although we usually issue ten numbers per year, the number was cut to six this year on account of shortage of funds. These numbers were as follows:

No. 1. March in Your Garden. By Montague Free. March 16.
No. 2. April in Your Garden. By Montague Free. April 13.
No. 3. May in Your Garden. By Montague Free. May 4.
No. 4. The Genus Prunus (Cherries, Plums, Etc.) in the Brooklyn Botanic Garden. By Alfred Gundersen and Charles F. Doney. May 11.
No. 5. June and July in Your Garden. By Montague Free. June 22.
No. 6. October in Your Garden. By Montague Free. October 19.

We continued our usual method of sending frequent news releases about Garden events to the principal metropolitan dailies, 39 articles having been sent from this department. In addition releases about the activities of the Garden were supplied to the press by the Brooklyn Publicity Bureau, as usual. A total of 1564 clippings were received, as against 931 in 1931.

Respectfully submitted,
ARTHUR H. GRAVES,
Curator of Public Instruction.

REPORT OF THE CURATOR OF ELEMENTARY INSTRUCTION FOR 1932

DR. C. STUART GAGER, DIRECTOR.

Sir: I hereby present my annual report for the Department of Elementary Instruction for the year 1932.

Since the general plan of activities for this Department is well known to you, and through you, to our Trustees, I shall this year pick out and emphasize the extent of our work and the new features which have entered into it.

The supervision of the greenhouses, distribution of materials, and work with visiting classes are directly under the Acting Assistant Curator, Miss Dorward; distribution of seed (penny packets for school children) and general nature study have been assigned to Miss Miner; the outdoor garden, with all its activities,

has been placed under the leadership of Miss Jenkins. This is our general outlay and assignment of work.

Distribution of Materials

Since the time element for this work, because of its great demands, is difficult perhaps to realize, figures may be useful as a medium for clearer understanding. Perennial and annual plants were supplied to twenty-eight different schools and other institutions such as the Kings County Hospital and the Brooklyn Home for Consumptives. To these twenty-eight institutions, over 3000 plants were given, which helped nearly 12,000 teachers to instruct over 55,000 children. This is one item in our work which represents not just mere handing out of material on request from schools, but raising and caring for the plants in our own greenhouses. These figures do not include the number of plants placed in classrooms of visiting classes, or given to other schools by request. Nearly 2000 plants were distributed for nature study work alone: about 750 plants were given to visiting classes for decoration of their classrooms; over 27,000 plants were raised by classes of teachers, children, and general public, and the lives of over 100,000 children were touched through this work. There must be a large supply of stock in our educational greenhouses to cover such demands. It might be of some interest to you to see a list of stock plants which were in our greenhouses ready for work in early September. Later in the season many plants were lifted from the outdoor garden to be used for greenhouse work, so the following list does not represent the peak of supply which offers opportunity for greenhouse class work to about 1500 people —children and adults.

Seedling ferns	191	Alternanthera	20
Boston ferns	239	Kentia Palm	35
Holly ferns	183	Stenotaphrum	39
Asparagus plumosus	3	Iresine	31
Asparagus sprengeri	34	Peperomia	21
Trailing Coleus	74	Ornamental Pepper	305
Large Coleus	44	Geranium (5 types)	220
Helxine	21	Desert plants	607
Tradescantia	54	Collection of house plants and mixed stock plants	157
Sensitive plant	56		
Sweet Basil	49		

A great deal of material is given out to nature study classes. For this study material we have had during the year about 250 requests from 165 schools and institutions such as the Girl Scouts, School Nature League, Children's Museum, Lawrence Public School, and Cedarhurst Elementary School. The material varies much in nature, from the loan of our flower models to seed dispersal material; from sphagnum moss to twig mounts; from mounted leaf specimens to live plants. During the past summer, one of our high school boys was engaged to press and mount specimens of leaves which represent the trees mentioned in the *Syllabus for Nature Study for Grades 1–6* of the New York City schools. These mounts, properly labeled, were distributed to a number of schools and Nature Rooms in order to find out if such mounts would be of any real value for classroom nature work. Numerous letters were received expressing appreciation of this service and of the material supplied, which is to be kept as part of a permanent collection of study material.

Classwork

The Department has tried the following new experiment with visiting classes. It has been our aim to present such work that it shall be a part of the regular classwork prepared for by the class before coming to us and carried on afterward in regular class sessions. In order to help insure this carry-over, the lessons of last spring and this past fall were arranged in monthly series for three successive months for Grades 3–6; one subject for Grade 3 in one month, another subject for the same grade for the next month, and another for the third month. This plan was arranged so as to encourage the same class to come for the whole series, but the subjects were so arranged that they had no relation one to the other. The tie-up was entirely with the Course of Study; so, if a grade could come only once, continuity was not broken. A most encouraging response came from this. Some schools sent all these grades, 3–6, once a month for three months. Other schools sent every single grade in the school for one session. Over 40,000 children came in contact with us in this way. There was much enthusiasm shown by both teachers and pupils. The results, in class work, were most gratifying. Some schools went even farther

FIG. 7. Demonstration group of 200 in Nature Study at P.S. No. 6, Brooklyn, May 31, 1932. There were 400 pupils in this school, taught in two groups of 200 each. The lesson was given on alternate weeks by the curator of elementary instruction, Miss Shaw, with a follow-up by the school teachers, each with her own class, for six weeks during the spring term. The charts shown were made by the pupils as part of their assigned work. Note the quantity of living plants sent from the Botanic Garden as study material for this course. (8072.)

and sent the same class once a week for one whole term; the Brooklyn Ethical Culture School sent a sixth-year class once a week for the entire year. This has been our most outstanding experiment in visiting class work, and because of its enthusiastic support and its real educational value, I mention it here.

P. S. 6, through Miss Lorraine Ferguson, Assistant Principal, requested that the Curator come to their school once every two weeks for a series of lessons in nature study for fourth and fifth year pupils. Four of these lessons were given in the school auditorium from February to April.

Our Saturday morning work with children has gone on as usual with work in January and February for silver and bronze medals. Children leaving us for the summer and working for honors, put in extra time in these months to make up for some of the work they miss during the summer season.

Spring classes were organized on the 13th and 20th of February, and continued until May 1932. During the spring session a group from the Lynbrook High School visited the classes and carried back some of our plans for their own school. The children's classes are often visited in this way, thus extending our work and helpfulness. A high school science teacher from Altoona, Pennsylvania, after a spring visit, started a correspondence with our young people and her young people, in which they discussed experiments and results.

Outdoor Garden Work

Two hundred fifteen boys and girls registered for the outdoor garden. Some of our larger gardens were used for the experimental work for silver pins and directed by the Acting Assistant Curator. The following subjects were taken up and show the scope of this work.

1. Ornamental Peppers and Jerusalem Cherries
2. Trees
3. Variations in the Parts of a Flower As Seen in Our Common Garden Flowers
4. A Study of the Rose Family
5. A Study of Desert Plants
6. Crossing in Nasturtiums

7. A Study of the Weather in the Month of August
8. A Study of the Seeds of Our Common Garden Flowers
9. A Study of the Fruits of Our Common Garden Flowers
10. Some Interesting Myths and Legends about the Vegetables We Grow in Our Garden
11. A Study of the Beach Vegetation on Long Island
12. Making of Charts for Use in Teaching the Variation of Leaf Forms
13. The Perennial Border, Noting the Succession of Bloom from June to September
14. The Water Plants Found in Our Brook

The Sutton Garden, started the year before with seeds bought from the Sutton Company, England, was continued this year. A colored plan was made of it which is to be sent to Sutton's.

One of the most successful summers in the outdoor garden was this summer of 1932. Attendance was good. Some of our older boys were used in small positions in the garden, and conducted themselves creditably. Rosemary Kennelly, under the direction of the head of the children's garden, remade the children's garden model; William Schwind made a plan of the north section of the children's formal garden, including the shrubs; John Spollen made two plans of the Shakespeare Garden during his allotted time, a finished plan of the garden as it stood this season, and one with only the permanent plants in it to aid us in planning future plantings in the Shakespeare garden.

In addition to the regular young people in our garden, a group of twenty girls called The Young Defenders' League, of P. S. 80, Brooklyn, took one of the larger gardens. They met on Wednesday afternoons before school closed and carried on their work throughout the summer. This was a successful piece of work.

Quoting from the Head Garden Teacher's Report, I may add, "Parents' Day was held on Wednesday, July 20. The garden was open from nine until eleven o'clock for parents to observe their children at work on their gardens. A group of children acted as guides around the garden and presented mothers with bouquets and fathers with boutonnieres.

"One of the new requirements for the cups was attendance at eight out of nine 'Executive Sessions' held every Thursday morning. The schedule for these was as follows:

July 7—Miss Jenkins—Garden Teaching Methods
" 14—Miss Miner—Brooklyn Botanic Garden Administration Building
" 21—Miss Shaw—History of the Children's Garden
" 28—Miss Miner—Nature Study, Local Flora Section
August 4—Miss Dorward—Gifts to the Garden
" 11—Miss Jenkins—Shakespeare Garden
" 18—Miss Dorward—Japanese Garden
" 25—Miss Dorward—Greenhouses
September 1—Dr. Reed—Experimental Field."

The rose garden, in our little formal garden, was rededicated in June—to the memory of Bernard Goodman, one of our older boys who passed away in October, 1931. Simple exercises were held on Saturday afternoon, June 18, for the Goodman family and those boys and girls who had been so many years with Bernard in the garden.

The planting of the formal garden has been entirely changed this year, and the perennial garden remade. Some of the seedlings started by the children for these gardens were given to the Brooklyn Naval Hospital, where a small garden was started under the direction of our Head Garden Teacher.

Seed Distribution

Penny packets of seed were filled and distributed as usual. We owe thanks to some of our "Emergency" helpers who worked steadily and well. During this year over 670,000 packets were distributed, representing orders from 335 different schools. Some of these schools sent in more than one order so that 549 orders were received. Letters of appreciation are constantly being received for this work, which, while representing much labor and a great deal of detail, is one of our great sources of helpfulness to the schools.

This year we have kept what we call a "contact book"; in which, month by month, each contact—whether it be through teachers' classes, distribution material, penny packets of seed, lectures, or any other piece of work we do—is tabulated. This book is of great value, not only in making both monthly and yearly records, but in its availability for any visitor who might like to see the extent and amount of our work.

FIG. 8. Leaf-mounting. Part of a class from P.S. 206, Brooklyn, November 13, 1932, studying the forms and structure of leaves. Miss Jenkins, Botanic Garden instructor, in charge. (7301.)

We have set up 15 special exhibits which were viewed by about 40,000 people. Start at New Orleans in January; come to the Flower Show in New York in the spring; to Bay Shore in June, and to Atlantic City at the end of June, and you will have a little geographic view of our travelling exhibits. We received a blue ribbon at the Long Island Flower Show in Bay Shore, which was sponsored by the Second District of Federated Garden Clubs of New York State. Our entry was the model of a little outdoor garden such as children might set up. This was not entered in competition.

The Department of Elementary Instruction during 1932 conducted in regular classes, visiting classes, and lectures, both at the institution and outside, over 2000 periods of work, with a total attendance at these sessions of over 140,000.

Needs

Our greatest need in greenhouse work is a propagating house for raising stock plants. Our present greenhouses are for instruction and are built and arranged for this. The difficulty of maintaining good stock plants in houses constantly used by classes is a problem hard to meet satisfactorily.

We need available funds in the seed work so that we may engage, during the summer each year, at least one older boy or girl to take charge of the seedroom; also to employ several young people to work on the preparation of mounts and nature supplies for distribution to schools during the fall and winter.

In the Department we should have one person, not necessarily a teacher, to arrange materials, run the lanterns, and do such pieces of work that now take the time of instructors which might be freed in this way for richer educational work.

We need, and have needed for many years, a car so that we shall not have to depend upon the bounty of friends of the Garden and on schools in order to transport materials and lecturers from point to point.

Personal Activities

During the past year the Curator has written a weekly article for the New York *Sun* from January to November; a series of five articles for *McCall's* Magazine, and five articles for "*New Jersey Gardens.*"

I was elected President of the Department of Science Instruction of the National Education Association, which met in Atlantic City last June, where I presented a paper. A paper prepared by Miss Miner and myself was presented at the meeting of the American Association for the Advancement of Science at Atlantic City in December.

I was appointed Consultant for children's garden work for the Federated Garden Clubs of New York State.

This fall the Winnebago County Superintendent of Schools at Rockford, Illinois, invited me to lecture at the Winnebago County Institute on October 19 and 20. It was impossible to accept this invitation on account of pressure of work at the Garden.

Respectfully submitted,

ELLEN EDDY SHAW,
Curator of Elementary Instruction.

REPORT ON THE LIBRARY FOR 1932

DR. C. STUART GAGER, DIRECTOR

Sir: In the absence of the librarian, on account of illness, the report on the library for the year 1932 is submitted by his assistant.

ACCESSIONS

The total number of volumes now in the collection is 17,451, of pamphlets, 13,487, an increase of 676 volumes and 747 pamphlets. We have been unusually fortunate in receiving a larger number of our accessions as gifts, 137 volumes, 472 pamphlets and the current numbers of 105 periodicals having been added through the generosity of our friends. The following are especially to be noted:

Given by their respective authors:

Knoche, Herman. Flora Balearica. 4 vols. 1921–1923.

Lemée, Albert. Dictionnaire descriptif et synonymique des genres de plantes phanérogames. V. 4. Brest, 1932.

Given by:

Mrs. Clarence R. Hyde.

Angier, B. S. The garden book of California. San Francisco, 1906.

Anonymous. In a Tuscan garden. London, 1902.
Bigelow, J. Florula Bostoniensis. 2d edition. Boston, 1824.
Burbidge, F. W. The book of the scented garden. London, 1905.
Du Cane, Ella and Du Cane, F. The flowers and gardens of Madeira. London, 1909.
James River Garden Club. Historic gardens of Virginia. Richmond, 1923.

Mr. Kenneth K. Mackenzie.

Brown, R. Prodromus florae Novae-Hollandiae. London, 1810.
Gronovius, J. Flora Virginica. Leyden, 1762.
Salisbury, R. A. Prodromus stirpium in horto ad Chapel Allerton. London, 1796.

Miss Mabel Patterson.

Popular Science Monthly. Vols. 1–21, 1872–1882.
————. Supplement, nos. 1–20, 1877–1878.

A complete list of donors will be found in Appendix 1.

The number of periodicals and serials received is somewhat less than usual, undoubtedly due to the fact that many institutions did not publish any material this year. Some turned annual reports into biennials, or otherwise combined publications; others asked us to substitute a subscription for an exchange basis, and as we were unable to do so, our file lapsed. This drop probably is a temporary one, in as much as we are still on the mailing lists of most of our previous exchanges which will be re-established as conditions improve.

LIST OF SOME IMPORTANT ACCESSIONS

Reference Books

Bradley, M. A. and Hunt, M. G. Index to publications. U. S. Dept. of Agriculture. 1901–1923. 1932.
Britten, James and Boulger, G. S. British and Irish botanists. 2d ed. London, 1931.
Heilprin, A. Lippincott's Gazetteer. Philadelphia [c1922].
International Address Book of Botanists. London, 1931.
Union List of Serials. Supplement. H. W. Wilson Company, 1931.

Books

Adamovic, Lujo. Die Pflanzenwelt der Adrialänder . . . Jena, Gustav Fischer, 1929.

Barton-Wright, E. C. Recent advances in botany. Philadelphia, P. Blakiston's Son & Company, 1932.

Brown, N. E. and others. Mesembryanthema. L. Reeve, Ashford, Kent, 1931.

Buller, A. H. R. Researches on fungi. London, 1931. V. 4.

Casares-Gil, A. Flora Iberica; Briofitas. Pt. 2. (Musgos.) Madrid, 1932.

Culpeper, Nicholas. Pharmacopaeia Londinensis. 6th edition. London, Peter Cole, 1659.

Cunningham, G. H. The rust fungi of New Zealand . . . Dunedin, N. Z., John McIndoe, 1931.

Curtis's Botanical Magazine Dedications, 1827–1927. London, Royal Horticultural Society, 1931.

Ellis, David. Sulphur bacteria, a monograph. London, Longmans, Green & Company, 1932.

Felt, E. P. and Rankin, W. H. Insects and diseases of ornamental trees and shrubs. New York, Macmillan Company, 1932.

Franchet, Adrien and Savatier, Ludovic. Enumeratio plantarum in Japonia, etc. 2 vols. Paris, F. Savy, 1875–1879.

Gray, James. A text book of experimental cytology. Cambridge, University Press, 1931.

Hedges, E. S. Colloids. London, Edward Arnold & Company, 1931.

Holmskjold, Theodor. Beata ruris otia fungis Danicis . . . Havniae, Brummer [1790–1799]. 2 vols. in 1.

Kostytschev, S. P. Lehrbuch der Pflanzenphysiologie. V. 2. Berlin, 1932.

Lambert, A. B. A description of the genus Cinchona . . . London, B. & J. White, 1797. (First edition.)

Liebig, Justus. Chemistry in its application to agriculture and physiology. New York, Wiley & Putnam, 1847.

Linné, Carl von. Philosophia botanica. 4th edition. Halae ad Salam, Kümmel, 1809.

Liu, J. C. Systematic botany of the flowering families in North China. Peiping, Vetch, 1931.

Massart, Jean. Esquisse de la géographie botanique de la Belgique. 2 vols. Bruxelles, 1910.

Nordenskiöld, Erik. The history of biology. New York, Alfred A. Knopf, 1929.

Paullin, C. O. Atlas of the historical geography of the United States. Carnegie Institution, Washington, 1932.

Persoon, C. H. Mycologia Europaea . . . Erlange Palmii, 1822–1828. 3 vols.

Rádl, Emanuel. The history of biological theories. London, Oxford University Press, 1930.

Ray, John. Catalogus plantarum Angliae . . . Londini, 1670. (First edition.)

Russell, E. J. Soil conditions and plant growth. 6th edition. London, Longmans, 1932.

Russia. Congress of genetics, plant and animal breeding. 6 vols. Leningrad, 1929.
Rydberg, P. A. Flora of the prairies and plains of central North America. New York, New York Botanical Garden, 1932.
Saccardo, P. A. Flora Tarvisina renovata. Venice, 1917.
——. Sylloge fungorum . . . Supplement. Berlin, 1931.
Sarton, George. Introduction to the history of science. V. 2, pt. 1–2, Baltimore, Williams & Wilkins, 1931.
Schaeffer, J. C. Fungorum . . . Bavaria . . . Icones . . . V. 1–6. Erlangae Palmium, 1800.
Schweinitz, L. D. von. Synopsis fungorum Carolinae . . . [Leipzig, 1822] (On dedication page is the signature A. Gray, Aug. 1885.)
Seward, A. C. Plants, what they are and what they do. Cambridge & New York, University Press, Macmillan Company, 1932.
Shreve, Forrest. The cactus and its home. Baltimore, Williams & Wilkins, 1931.
Singer, Charles. A short history of biology . . . Oxford, Clarendon Press, 1931.
Stuart, C. M. Villiers. Gardens of the great Mughals. London, Adam & Charles Black, 1913.
Waksman, S. A. and Starkey, R. L. The soil and the microbe . . . New York, John Wiley & Sons, Inc., 1931.
Wilder, G. P. The breadfruit of Tahiti. Honolulu, Bernice P. Bishop Museum, 1928.

Periodicals

Horticulturist, and journal of rural art and rural taste. 4 vols. Rochester, 1854–1858.
Kühn-Archiv: Arbeiten aus den Landwirtschaftlichen Instituten der Universität Halle. V. 8–29. Berlin, 1919–1932.
Natur und Museum. V. 53–61. Frankfort am Main, 1923–1931.
Revue générale de botanique. V. 1–19. Paris, 1889–1907.
Science. (Old series.) 5 vols. 1883–1885. V. 1–2, 4–6.

Co-operation with the Emergency Unemployment Relief Committee

Throughout the year, the library has been employing several persons sent from the Emergency Unemployment Relief Committee, for indexing, filing, and other clerical work.

1. The indexing of two sets of colored plates (Curtis, *Botanical Magazine,* vol. 131–155, and Bonnier, *Flore Complète* . . . vol. 1–10) adds much to our illustrative material as they supplement by almost ten years the *Index Londinensis.*

2. Cards for subject analytics for articles indexed by the Torrey

Club were written and filed. This brings the subject index up to date to July.

3. Another worthwhile project was accomplished by one of these workers who looked through the entire set of *Botanisches Centralblatt* (1880–1932) for biographical material and made cards for individual biographies which have been filed in the library catalogue. This enables us to locate at once obituary notices, dates of birth and death, portraits and bibliographies of many botanists who might otherwise be difficult to trace. If possible this work should be supplemented by similar references from all our periodicals.

4. By far the most ambitious work undertaken this year was the making of an author index for the last four volumes of *Botanical Abstracts*, vol. 12–15 inclusive, which were published and bound with no indices. Through the courtesy of Dr. Jacob R. Schramm, the present editor of *Biological Abstracts* (into which was merged the former *Botanical Abstracts*) we obtained slips, forms, material, and advice regarding making indices to conform to those of previous volumes. The idea is to acquire a useable author list for ourselves for the present, which could be turned over to the publishers when they were prepared to print it, thus benefiting them as well. Two volumes, 12 and 13, are completely indexed, the slips revised, alphabetized, and ready for use. Author indices to vols. 14 and 15 have been typed, and are being held for revision.

5. Last spring the librarian, Mr. Foss, worked out a scheme of classification in order to catalogue by subject the lantern slides which have been made from the Brooklyn Botanic Garden negatives. This scheme is still waiting for approval, but meanwhile, one of the untrained workers has copied the existing catalogue cards pertaining to the slides, which should greatly facilitate the work of re-arrangement.

6. One of the minor, but necessary, pieces of work was the thorough cleaning, dusting, and rubbing down of the leather bindings of the books on the shelves. This is done to protect and preserve the bindings and to prevent the dust from sifting through the pages to their detriment.

Use of the Library

By the completion of some runs of serials, the addition of certain historical works, as well as some of the newer publications, we have been able to verify citations, refer to articles, and trace work for the curators and students of the Brooklyn Botanic Garden more easily and rapidly than formerly. The work with members of the Garden and people who come for lectures or classes continues as usual. Many who come in for guidance to certain parts of the Garden and greenhouses, stay to examine books and periodicals. Our borrowings through the inter-library loan system were less, twenty-four volumes only having been lent us in 1932, although there were thirty-five in 1931, proving how our own material comes nearer to meeting demands. On the other hand, many more requests were made for us to lend material to other institutions. An increasing knowledge of our collection is shown by the greater number of volumes loaned during the last four months of 1932. The following report tells how widely these institutions are distributed.

Interlibrary Loans

Fifty-three volumes were lent to the following: Messrs. Batten, Barton, Durstine and Osborn, New York; Brooklyn Museum Library; Brooklyn Public Library; Buffalo City Hospital (Mr. Irving Knobloch, Botanist); Buffalo Public Library; Carnegie Institution of Washington, Department of Genetics, Cold Spring Harbor, L. I.; University of Chicago Library; Columbia University Library; Flagler Memorial Library, Miami, Florida; Rev. Fred W. Gray, Philippi, West Virginia; Mr. Kenneth K. Mackenzie, New York; Metropolitan Life Insurance Company, New York; National Aniline and Chemical Company, Inc., New York; New York University; Princeton University Library; Rockefeller Institute for Medical Research, New York; Rutgers University Library, New Brunswick, New Jersey.

Twenty-four volumes, in all, were borrowed from the American Museum of Natural History; Mr. Kenneth K. Mackenzie; Brooklyn Museum Library; Brooklyn Public Library; Columbia University Library.

Reference Work in the Library

Among the reference questions put to the library this year are the following, as noted from day to day:

Material on Mediterranean fruit fly, locusts, sisal hemp, cacao, greenhouse management, flower arrangement, raspberry mosaic, methods of "dry farming" adapted to France, origin of the dahlia and its native name, paper mulch, wild flower gardening, cultivation of holly.

We were asked to make a list of books on horticulture for a person buying a house in the country; where to buy electrical heating coils for hot-beds; how to graft fruit-trees; what is the composition and commercial value of humus; how to make a sun-dial. Also, various people wrote to members of the Garden staff asking for information which was available in the library. This entailed further correspondence, listing of books, and sometimes, eventually, visits to consult the references. A publicity agent came to identify a tree used as a trade-mark on a label. A student looked up all varieties and hybrids of *Clematis* noted in early works. Many people asked for illustrations of flowers and plants to use in designing costumes, decorating cards, and similar purposes. Material on products of foreign countries was furnished for a lecture.

American Fern Society Collection

The library of the American Fern Society has been housed in our library since 1930. It has been somewhat increased by gifts and exchange, and is used by a number of the members of the Society. Our readers find it to their advantage to have at hand extra material which is not represented in our own collection. The statistical report is included with that of the Brooklyn Botanic Garden Library.

Present Needs of the Library

If the library work is to go on as the librarian planned and expected, in his continued absence, another trained assistant is needed. The work cannot be adequately handled without loss of accuracy under existing conditions. Too much is being sub-

merged under "daily routine" and the revision of extra work done by the untrained workers is, of necessity, being neglected. Since we have the opportunity to profit by such helpers, we should be able to find time for such necessary co-operation as would make their work effective.

The lack of funds for binding has been felt most severely. We have on hand at least 2000 volumes of serials and periodicals, exclusive of government and state publications, which should be bound to preserve their parts and to make them more easily available. As only 343 volumes were bound in 1931, and 372 in 1932, the unbound volumes are piling up in an appalling manner. With over 900 periodicals on our list, many of which run two, three, or four volumes a year, the total of volumes for binding increases amazingly. The difficulties of filing unbound parts, the chance of their being lost, or misplaced, should also be taken into consideration. There are, also, many paper covered books which should be bound, as well as some old volumes whose covers have become shabby and worn out, which need re-binding.

New book lists are coming in from all publishers. Never before have such bargains been offered, as many private libraries have come on the market owing to present conditions. It is most unfortunate that our funds do not allow us to buy freely, as certain scarce items will hardly be duplicated at the present prices. Many complete sets and lacking volumes could be found were there sufficient money to justify their purchase.

In conclusion, we wish to express our thanks and appreciation to all the members of the Garden staff, whose patience and co-operation have been of great assistance to the library.

The statistical report follows.

Respectfully submitted,

EMILIE P. CHICHESTER,
Library Assistant in charge.

STATISTICAL REPORT ON THE LIBRARY

Accessions

	Autograph Letters	Portraits	Volumes	Pamphlets	Parts (Including Periodicals)
Exchange	0	0	53	132	3,253
Gift	71	65	137	472	1,275
Publication	0	0	0	131	51
Purchase	0	7	114	12	917
By binding	0	0	372	0	0
Total	71	72	676	747	5,496

Total number of volumes in library, December 31, 1931	16,775
Number of volumes added during 1932	676
Total number of volumes in library, December 31, 1932	17,451
Total number of pamphlets in library, December 31, 1931	12,740
Number of pamphlets added during 1932	747
Total number of pamphlets in library, December 31, 1932	13,487
Total number of volumes and pamphlets in library, December 31, 1931	29,515
Net increase of volumes and pamphlets during 1932	1,423
Total number of volumes and pamphlets in library, December 31, 1932	30,938

American Fern Society Collection

Number of volumes, December 31, 1931	31
Number of volumes added during 1932	5
Total number of volumes, December 31, 1932	36
Number of pamphlets, December 31, 1931	67
Number of pamphlets added during 1932	89
Total number of pamphlets, December 31, 1932	156

Serials and Periodicals

(Including only those of which numbers were received in 1932)

Subscription	128
Gift	105
Exchange	663
Publication	7
Total	903

Cataloging

Books, Pamphlets, and Serials cataloged	1,482
Total number of cards typewritten and filed	3,033

Printed Cards

Torrey Botanical Club index cards on file, December 31, 1931	42,578
Filed during 1932	2,207
Total, December 31, 1932	44,785
Index Algarum Universalis cards, December 31, 1931	27,940
Number of cards received during 1932	3,000
Total, December 31, 1932	30,940
Catalogue en fiches de la Bibliographie Technique et Agricole Tropicale, Institut Colonial de Marseille, December 31, 1931	8,267
Number of cards received during 1932	1,426
Total, December 31, 1932	9,693

Miscellaneous

Number of users of the library	3,633
Books lent to members of staff	1,127
Books lent to other institutions	53
Books borrowed from other institutions	24

REPORT OF THE CURATOR OF PLANTS FOR 1932

Dr. C. Stuart Gager, Director.

Sir: I submit herewith my annual report for 1932.

Iris Plantations

Dr. Reed, in charge of Iris, reports as follows: "There were several additions to the *Iris* collection. By exchange and collection, we received 18 species and varieties, most of them the Beardless types. Mr. S. Tanaka made, in different parts of Japan, 29 collections of wild *Iris* in the summer of 1931. Most of these were *Iris Kaempferi* var. *spontanea.* However, *I. laevigata, I. sibirica, I. setosa,* and *I. Rossii* were also represented. The collected plants were sent by Mr. Tanaka to the Yokohama Nursery Company, Ltd., who took care of them until early in the year, when they were forwarded to us. We obtained by purchase 60 varieties of the cultivated Japanese *Iris.*"

We are indebted to the Arnold Arboretum, through Mr. W. H. Judd, for plants or cuttings of a number of rare species. Other plants were obtained from the extensive nursery of the Boyce Thompson Institute, from the Estate of Mr. Anton Hodenpyl, and others. A number of plants were imported from nurseries in Japan, Germany, England, and Ireland. Also, plants have been obtained from seeds through the International Seed Exchange. We have made some exchanges with the Sanford Arboretum, in Tennessee. The additions have been in many cases trees and shrubs of doubtful hardiness, which have been placed in protected parts of the nursery. Though some of these have lived through the several mild winters, which we happen to have had in succession, they are liable to die in a severe winter. Among them may be mentioned: *Choisya ternata, Ephedra distachya* and *E. procera, Loropetalum chinense, Meratia praecox, Marsdenia erecta, Meliosma myriantha, Ruscus aculeatus, Tetracentron sinensis.* Some special provision for the semi-hardy species where they could be protected and where they might be seen by the public, would be very desirable.

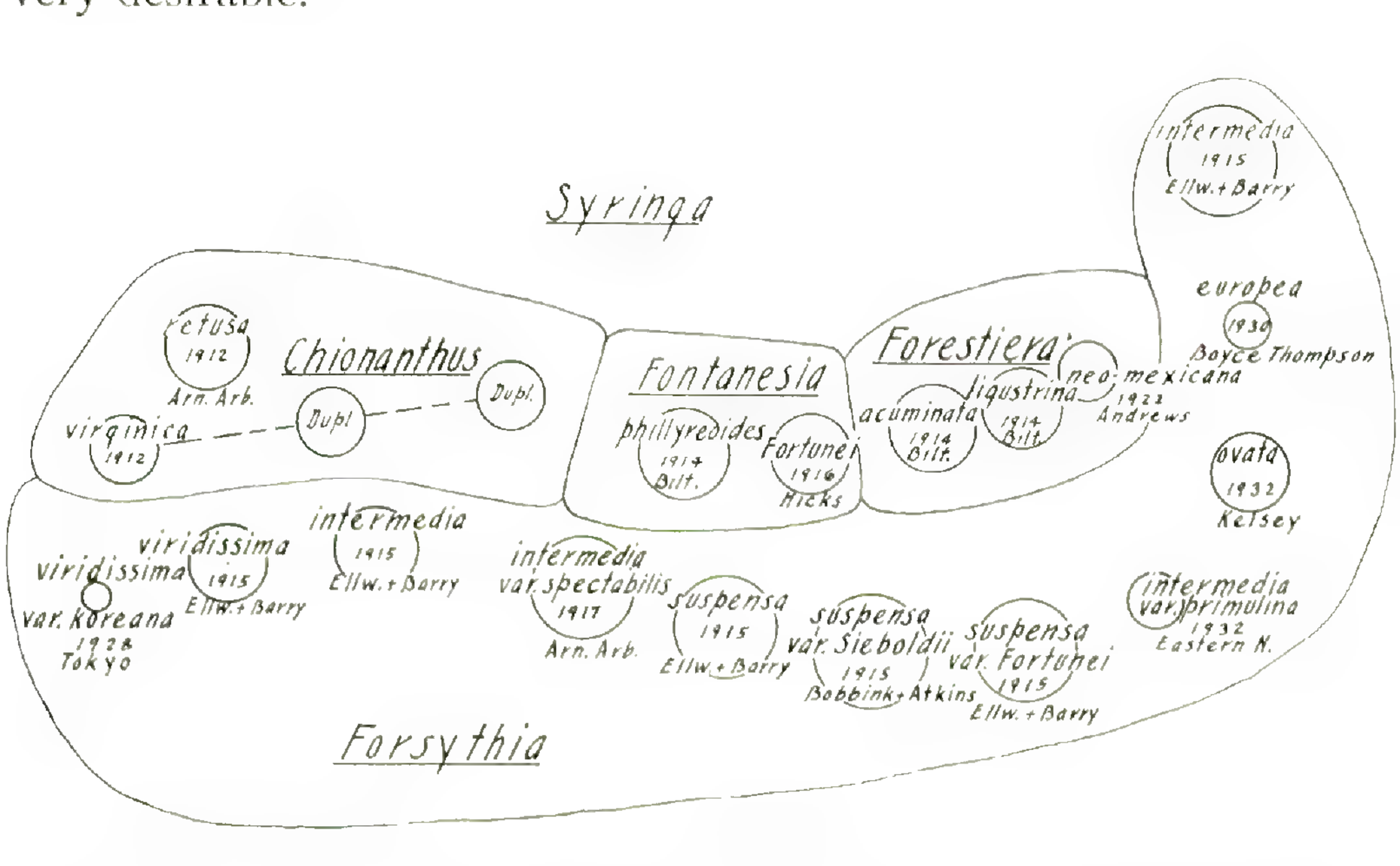

Fig. 9. Diagram showing arrangement of *Forsythia* and other genera at the south edge of the Olive Family group. The entire Systematic Section of the Garden is mapped in a similar way. The size of the circles represents the comparative spread of the shrubs. The data include name, date of accessioning, and nursery or other source.

With the increase of the collections, it is becoming more difficult to obtain additional distinct and hardy species. Further, in the case of several groups, the space allotted is fully taken up.

Maps of Collections

With the increase of the number of species and varieties, keeping record of the plants by mapping becomes more necessary. Figure 9 shows a map of the genus *Forsythia*. We have still many trees and shrubs on the grounds which have never flowered. Thus the exact name may remain undetermined for years. Mr. J. Pollio has prepared on tracing cloth three large maps of the systematic section of the Garden. One shows the location of genera of trees, another genera of shrubs, and the third plant families represented on the grounds.

List of Trees and Shrubs

The Kew Hand List of Trees and Shrubs, 3d edition, was published in 1925; this list has been very useful to us. Its arrangement by the Bentham and Hooker system makes it inconvenient for our garden, arranged by the Engler system. With Mr. Rehder of the Arnold Arboretum I have been making a checklist of hardy trees and shrubs based on his Manual. In the spring and again in the fall I visited the Arboretum for consultation about details. This list is now approaching completion. It is intended to include the names accepted by the New International Rules as well as the names used in the Kew *Hand-List of Trees and Shrubs, Standardized Plant Names,* Gray's *Manual,* Schneider's *Handbuch* and a few other important publications. There may be some question as to how rapidly we should attempt to proceed in changing names long established in our garden and in botanical literature. Possibly the question of "specific names to be conserved" (*nomina specifica conservanda*) may come up again at the next Botanical Congress. Before then the new International Horticultural List will be available. In any case, a hand list of species is needed in gardens in making records about the plants. In order to plan for the future we must know readily what we have, compared to what we might have, in any group.

Spiraea

The present state of the collections may be illustrated by the genus *Spiraea,* as follows:

On the Grounds	In the Nursery	Desiderata
American species		
Spiraea		
Billiardii	*corymbosa*	*alba*
latifolia		*virginiana*
lucida		
Menziesii		
tomentosa		
albiflora	*calcicola*	*Blumei*
arbuscula	*cana*	*canescens*
cantoniensis	*longigemmis*	*media*
chamaedryfolia	*Miyabei*	*pyramidata*
crenata	*mollifolia*	*trilobata*
gemmata	*Sargentiana*	*Zabeliana*
Henryi		
Old World species		
hypericifolia		
japonica		
nipponica		
prunifolia		
Thunbergii		
trichocarpa		
Veitchii		
Wilsonii		
bumalda var.	× *Schinabeckii*	*prunifolia fl. pl.*
Anthony Waterer	× *syringiflora*	
cantoniensis fl. pl.		
Horticultural forms		
Fontenaysii var. rosea		
× *Margaritae*		
× *superba*		
Thunbergii fl. pl.		
× *Vanhouttei*		

We have approximately one-third of the total number of *Spiraea* species. The ones listed as desiderata are some of the more desirable or distinct of those we lack.

Courses

During the spring I gave an outdoor course of eight lessons on "Ornamental Shrubs" (registration 34), continued with five lessons in the fall (registration 26).

Miscellaneous

During 1932 I acted as chairman of the Systematic Section of the Botanical Society of America, with Dr. N. M. Grier as secretary. A Symposium on "Methods and Objectives in Field Work," led by Dr. E. D. Merrill, was arranged for the Atlantic City meeting.

Labels and Signs

Labels and signs were made by Mr. John McCallum, labeller, as follows:

Galvanized iron labels for the herbaceous beds	354
Family labels for the beds	104
Lead labels for the woody plants	96
Lead labels for conservatory plants	40
Lead labels for the rock garden	265
Small wood labels	195
Wooden signs	43
Cardboard signs	329
Total	1479

Also numerous miscellaneous numbers and signs.

Statistics Relating to Living Plants

Living Plants Received:

	Species or Varieties	Plants
By collection	71	1,492
By exchange	205	411
By gift	253	756
By purchase	439	5,461
By seed	1,164	1,164
Total	2,132	9,284

Cuttings Received:

By exchange	26	263
By gift	8	11
Total	34	274

Living Plants Distributed:		
To members, etc.	87	3,052
By exchange	221	373
Total	308	3,425
Cuttings Distributed:		
By exchange	3	213

Respectfully submitted,

ALFRED GUNDERSEN,
Curator of Plants.

REPORT OF THE ASSISTANT CURATOR OF PLANTS FOR 1932

DR. C. STUART GAGER, DIRECTOR.

Sir: I submit herewith my report for the year ending December 31, 1932.

SYSTEMATIC SECTION

Herbaceous Beds.—The changes which are evident in the herbaceous beds consist in a transformation of the two poorly-drained *Crassulaceae* beds into a single elliptic bed which is raised a foot or so above the surface. The bed now has a natural rocky appearance, which is in conformity with the habitat of these succulents. The labels used are of the rock garden type. The gentian bed has also been reconstructed primarily for better drainage. During the general rearrangement of the Olive Family last year, the primrose (*Primulaceae*) and leadwort (*Plumbaginaceae*) beds were moved nearer the brook and seem to have prospered thereby.

LOCAL FLORA SECTION

This section will be opened to the public at the Spring Inspection, May 1933. Although transplanting of native vegetation has an experimental tinge and is not to be looked on with too much confidence, still we feel that many of the more difficult native plants are now thoroughly established. With the help of Mr. Free and Mr. Caparn the isolated units have been tied together, and the whole area is taking on an appearance of completion, due in large part to the construction of a grassway which extends through the

FIG. 10. Cherry Walk. View south from the north end. Fallen flowers on the ground. May 13, 1932. (8032.)

middle of the area, giving ample space to visitors and direct contact with the plantings.

The Meadow.—The most important addition during the past year has been a small meadow excavated parallel to the pathway, planted with clumps of *Trollius laxus, Caltha palustris,* and *Parnassia caroliniana,* into which asters and golden-rods have come spontaneously. Thus there is a bloom throughout the season. This meadow is fed by a small brook (constructed in the fall of 1932) which winds under the trees, but which has as yet only a temporary source of water. Upon final location of the boundary fence, it is hoped that the brook can be made a permanent feature and its course extended.

The sand-barren area has been filled with sand to the central pathway and now has a more natural appearance. It is expected that typical plants of this area, now well established (*Hudsonia, Tephrosia virginiana, Arenaria caroliniana, Silene pennsylvanica, Viola pedata, Aster spectabilis* and *A. concolor,* and *Asclepias tuberosa*), will make a good display during the coming year. With the addition of pitch pines (*Pinus rigida*) to be set out in the spring, the locality should give the impression of a fragment of the pine-barrens.

The area between the bog and the pathway has been partially excavated and filled with sand and peat. This area, moistened by drainage from the meadow, has been planted with *Chamaecyparis thyoides* (received on an exchange basis from Mr. Anton Hodenpyl), *Leiophyllum buxifolium, Kalmia angustifolia, Pyxidanthera,* and *Xerophyllum,* all well-known pine-barren species which require wet or at least somewhat moist conditions. Through this area there will be access to the adjacent bog.

The bog and its borders proved during the past year to be a successful place for the growth of many unusual plants. Orchids such as *Habenaria ciliaris, H. blephariglottis,* and *Pogonia ophioglossoides* did surprisingly well. The growth of *Eriocaulon* (*E. compressum* and *E. decangulare*), sundews (*Drosera longifolia* and *D. filiformis*), pitcher plants, gentians (*Gentiana Andrewsii* and *G. linearis*), *Sabatia, Helonias bullata, Bidens coronata,* and *Helianthus angustifolius* was especially noteworthy. A few plants of Venus's Flytrap, native only to North and South Carolina, sur-

vived through the unusually mild winter of 1931–32 with only a covering of leaves, and produced a number of flowers during the summer.

In the wooded area, devoted mainly to spring-flowering species, the display of Trilliums (chiefly *T. grandiflorum* and *T. erectum*), violets, spring beauty, hepatica, and buttercups (*Ranunculus hispida* and *R. septentrionalis*) was satisfactory, and the amount of material of these species has been greatly increased.

We are still in need of an area of limestone rock for the growth of walking-fern and other calciphile species. Such an area could have been built last year for a little over five hundred dollars. It is probable that the cost at present would be somewhat lower than this figure.

Phanerogamic Herbarium

In addition to the routine identification of specimens sent by garden members and others, I have identified the material collected by Mr. C. P. Freeman, of Nashville, in the Cedar Glades of Middle Tennessee. A set of these plants, about 400 numbers, has been given to the Brooklyn Botanic Garden. During the summer vacation I made progress on a survey of the plants in the Windham Valley of the Catskill Mountains. Herbarium specimens have been collected from this area and also from Long Island.

The herbarium is still in a state of turnover. During the year there have been added 7423 sheets of specimens, of which 1500 represent material which has been remounted. A large part of this material, in addition to some of the 11,900 sheets mounted last year, still remains to be permanently filed. But our collections are rapidly approaching a completed stage, at least so far as filing is concerned, and we expect that by the end of 1933 all of the specimens in the phanerogamic herbarium will be readily accessible. A count of the Pteridophytes shows 6042 sheets, which does not include about 700 awaiting distribution. We have been fortunate in having a continuation of the assistance of nine workers from the Emergency Work Bureau. We are still impeded in herbarium work by the ancient and heterogeneous filing covers which we have inherited from various sources. Statistics from the herbarium will be found appended to this report.

Herbarium Accessions and Distribution

Phanerogamic Herbarium

Accessions:			
By Gift:			
Dr. R. C. Benedict	3		
Mr. C. C. Deam	8		
Dr. D. Demaree	169		
Dr. J. A. Drushel	111		
Dr. G. P. Engelhardt	1		
Mr. K. K. Mackenzie	17		
Dr. Gunnar Samuelsson	1		
Mr. H. P. Ulich	50	360	
By Exchange:			
Miss Belle Burr	72		
University of California	301		
Dr. D. Demaree	107		
Gray Herbarium, Harvard University	57		
Philadelphia Academy of Natural Sciences	136		
U. S. National Herbarium	68	741	
By Purchase:			
Miss E. M. Kittredge	1	13	
By Collection:			
Dr. Arthur Harmount Graves	9	9	
Total			1,123
No. of Specimens Distributed			1,621

Cryptogamic Herbaria

Accessions:			
Fungi			
By Exchange:			
Dr. George L. Zundel, State College, Pa.	70		
By Purchase:			
H. Zillig, Germany	20		
H. Sydow, Germany	150		
Dept. of Botany, University of Minnesota	1,055	1,225	1,295

Other Cryptogams

By Gift:			
Mr. C. J. Svenson	50		
By Purchase:			
Fr. Verdoorn, Utrecht, Holland	100	150	1,445

No. of Specimens Distributed

By Exchange (Fungi):	
Dr. George L. Zundel, State College, Pa.	20

Seed Packets Received:

By collection	182
By exchange	2,007
By gift	287
By purchase	138
Total	2,614

Seed Packets Distributed:

By exchange	4,097
To members	682
Total	4,779

Classes

With the assistance of Miss Rusk, instructor, field classes for the study of local herbaceous plants and ferns were held as in previous years, at various localities in the vicinity of New York on Saturday afternoons in both the spring and fall.

Seed Exchange

In addition to my own collecting, seeds were collected in New York and vicinity by Mr. Montague Free, and Mrs. Margaret Putz; in the Adirondacks by Mr. C. F. Doney (who has in addition been largely responsible for the extensive collection of seeds of woody plants offered for this year); in the Catskills by Dr. Alfred Gundersen; in Maine by Dr. C. Stuart Gager; and in Connecticut by Mrs. Clarence R. Hyde. We are indebted to the State Forest Service, Wellington, New Zealand, for New Zealand coniferous seeds; also to the Arnold Arboretum and to Mr. Anton Hodenpyl for the privilege of collecting seeds of a number of uncommon plants on their grounds.

Respectfully submitted,

Henry K. Svenson,
Assistant Curator of Plants.

REPORT OF THE HORTICULTURIST AND HEAD GARDENER FOR 1932

DR. C. STUART GAGER, DIRECTOR

Sir: I have the honor to submit herewith my report for the year ending December 31, 1932.

PERSONNEL

The gardening force (nine men) was essentially the same as in 1932. As the construction work and planting in the Local Flora Section nears completion, the need for the whole time of a man to act as guard and gardener becomes obvious. From the paragraphs following it may be seen that considerable labor was available that was paid for by charitable organizations. This labor was not an unmixed blessing, as almost without exception the men supplied were utterly unskilled in garden work and that necessitated largely drawing our own men from their regular work to supervise them. Guards were maintained at the gates on Saturdays, Sundays, holidays, and after school hours from the beginning of April to the end of October. They are urgently needed throughout the year.

Our laboring force was put on a part time basis on October 16th.

LABOR PAID FOR BY CHARITABLE ORGANIZATIONS

Throughout the year forty-three men, paid by the Brooklyn Bureau of Charities, worked for a total of 3202 days.

One man, paid by the Brooklyn Association for Improving the Condition of the Poor, worked 159 days.

From January to October and in December forty-five men, paid by the Emergency Work and Relief Bureau, worked for a total of 1742 days.

GENERAL SYSTEMATIC SECTION

For several years plants in the Crassulaceae (Orpine Family—*Sedum, Sempervivum,* etc.) failed to thrive owing to the low-lying and poorly drained beds in which they were growing. These beds were amalgamated in one, raised a foot or more above the surrounding level with boulders, and suitable drainage provided.

The trees and shrubs in the Witch Hazel Family, having become

too crowded, were replanted—the necessary room being obtained by lopping a corner from the adjacent Rose Family, replanting some plants and eliminating duplicates.

A new bed was constructed along the brook for moisture-loving plants of the Buttercup Family and the Gentian bed was excavated and filled with new soil.

A trellis fence of green concrete posts and chestnut palings was constructed and erected to define the southern edge of the Urticales (Elm, Mulberry and Nettle Families) and to provide a support for various species of *Humulus* (Hops). This fence is in two sections, one of forty-three feet and one of thirty-three feet.

In the endeavor to obtain more rapid growth on the trees and shrubs most of them were heavily fertilized with poultry manure by the "punch hole" method.

The Drought

The rainfall has been below normal since the beginning of 1928. This succession of dry years, culminating in the severe drought of the summer of 1932 has been trying to vegetation and to gardeners. Our irrigation facilities are no longer adequate and it is impossible, during periods of severe drought, to give all our plants all the water they need. By adjusting the hours of gardeners so that the sprinklers could be kept running night and day the woody plants were fairly well taken care of, but the lawns and many of the herbaceous beds were a sorry sight at the end of summer.

Laboratory Plaza

The planting of this area was carried out in the Spring. Five thousand plants of English ivy (raised here) were set out to form an edging three feet wide around the concrete walks. About six hundred and fifty *Euonymus alatus compactus* were used to make dwarf hedges around the four central panels. Four hundred and fifty plants of California privet were planted to form the boundary of the Plaza. Eighty magnolias in twelve species and varieties, two tulip trees, and about sixty *Berberis* in variety were planted. About twenty *Schizandra chinensis* and twenty *Akebia quinata* were planted on the banks. The lawn areas were sown with seeds of "Colonial Bent Grass."

FIG. 11. Laboratory Plaza, facing southeast from Boulder Hill. April 29, 1932. The circular compass is not yet completed. Planted with magnolias and related shrubs. (8108.)

Ornamental Planting

The unsightly area of over 800 square feet outside the fence on Flatbush Avenue on either side of the Richard Young gate was graded, fertilized, and planted with two hundred and fifty *Acanthopanax pentaphylla*. The planting is protected by a pipe rail fence installed by our own men.

At the north end of the brook about six hundred square feet of planting space for water-loving iris was made by constructing on both sides of the brook a retaining barrier of split cedar poles and filling in behind it with suitable soil.

A new iris bed was made northwest of the swamp.

Local Flora Section

The topsoil was removed from an area of over nine hundred square feet and replaced with peat, and from an area of four hundred and fifty square feet and replaced with Long Island sand.

Six thousand square feet was dug over, mixed with peat moss, and made ready for planting.

A shallow brook was constructed, starting near the north end of the section and emptying into the "wet meadow."

A large area south of the bog was graded and a depression made to catch surface water.

A grass walk, fourteen feet wide, extending practically the whole length of the Local Flora Section, was graded and constructed by laying with turves.

Planting carried out is noted in the report of the Assistant Curator of Plants.

Miscellaneous

The walks in the Economic Plant House (of ashes surfaced with sand) served well in the early years of the Garden when visitors were few. With the enormous increase of users they became inadequate and were replaced with concrete walks during the winter.

Three flights of concrete steps were constructed near the North Flatbush Avenue entrance to eliminate an excessively steep grade. The banks on either side of the walk were surfaced with top soil and faced with boulders to hold the banks in place. A temporary

planting of Japanese honeysuckle was made to prevent soil erosion.

Foundations were laid for a permanent walk about 200 yards long extending from the steps to the macadam walk. The onset of winter prevented the completion of this work. Two catch basins and a hundred feet of connecting sewer pipe were laid to take care of surface water.

A retaining wall of concrete 110 feet long and 5 feet from foundation to top was constructed between the Experimental Plot and the Service Yard. Concrete steps were made to facilite ingress to the Experimental Plot.

A zinc strip edging was laid around the White Oak Circle to maintain grass verge, and the circle regraded and seeded.

Trenches were dug and water pipe laid as follows:

Local Flora Section, 240′ pipe, four faucets
North of Rock Garden, 160′ pipe, one faucet
Japanese Garden, 15′ pipe, one faucet.

For greater convenience 200′ of pipe was moved in the area near the reservoir and 70′ in the Children's Garden.

Requests for Information

Information on request was supplied as follows:

By telephone 181
In person 128
By letter 190.

Casual inquiries of visitors on grounds are not included in the above record.

Exhibits

At the January 20th meeting of the Horticultural Society of New York we exhibited one vase of *Calliandra inaequilatera* (Award of Merit) and one vase of *Daphne odora marginata* (Vote of Thanks).

At the February 17th meeting a plant of *Loropetalum chinense* was exhibited for which we were awarded a "Cultural Certificate."

Seed and Plant Distribution

In connection with the International Seed Exchange 4779 packets of seeds were distributed to foreign and domestic botanic

gardens and to other institutions and individuals during the spring of 1932.

Surplus plants were distributed to 287 Botanic Garden members in May (Chrysanthemum, 2770; miscellaneous herbaceous plants, 100), a total of 2870 plants.

We also supplied plants to the following public institutions:

Naval Hospital—Trees, shrubs, and herbaceous plants, 85

Brooklyn State Hospital (Creedmoor Division)—Conservatory plants, 37

Horticultural Society of New York—Conservatory Plants to furnish Wardian Case, 18

Personal Activities

I conducted the following "Courses for the General Public" at the Botanic Garden;

Plants in the Home: two courses, Spring and Fall. Five talks with demonstration.

Advanced Course in Gardening; seven of ten periods.

I acted as one of the judges for the Federated Garden Clubs of New York State at the International Flower Show, Grand Central Palace, March 14th; Yard and Garden Contest, Amenia, N. Y., June 20th; Brooklyn Fall Flower Show at the Central Methodist Episcopal Church, November 16th.

I conducted the "Garden Guide" column of the New York *Sun*. In this connection 1050 letters were sent out. This work was done, with the permission of the director, outside of regular Garden hours with stenographic assistance and other expenses paid for by the New York *Sun*.

I was appointed Horticultural Consultant for the Federated Garden Clubs of New York State, and served on the "Board of Consultants" of the publication "New York Gardens."

I am continuing to serve as the District Secretary of the American Rose Society.

Respectfully submitted,

Montague Free,

Horticulturist and Head Gardener.

REPORT OF THE RESIDENT INVESTIGATOR (FERNS) FOR 1932

DR. C. STUART GAGER, DIRECTOR.

Sir: I herewith submit a report of the various activities in which I have engaged during 1932.

SCHOOL SERVICE

As Chairman of the Program Committee of the New York Association of Biology Teachers, a series of speakers for the monthly meetings was arranged for by me. One of these was a special meeting scheduled jointly with the Torrey Botanical Club at the Brooklyn Botanic Garden and addressed by Dr. C. Stuart Gager. The final arrangements for this meeting were made by Dr. George M. Reed. They included a wide range of exhibits sent from the high schools, some from Brooklyn College Biology Department, and others from the Brooklyn Botanic Garden. The meeting had an attendance of approximately 400.

Three talks for high school students were given; two at the Brooklyn Botanic Garden, and one at the American Museum of Natural History.

The first New York State Regents Examination (the University of the State of New York), given in June, for the new State course in General Biology, was prepared by a committee of which I was a member.

EDITORIAL WORK

During 1932, the 22d volume of the *American Fern Journal* was issued. As a result of the special library supplement of the previous year and of special reviews in the *Fern Journal,* there has been an increasing demand for library loans made by members of the Fern Society. Since some of the borrowers have been specially stimulated to try technical methods of fern reproduction, there is a good prospect that interesting contributions may result.

There has been added to the Fern Society Library, the first three numbers of the *Acta Phytotaxonomica et Geobotanica,* published by the Phytogeographical Society, Botanical Institute, Fac-

ulty of Science, Kyoto Imperial University, Kyoto, Japan, which contained several very interesting fern articles. In addition, a series of copies of *Sinensia,* published by the Metropolitan Museum of Natural History, Academia Sinica, Nanking, China, including a number of papers by Ren-Chang Ching on Chinese ferns, have been received for the Library. These articles have more than ordinary interest for American fern students because of the rather large number of species reported as common to both regions.

Conservation of Native Plants

A considerable number of inquiries have been answered during the year regarding plant conservation. In this connection the copies of conservation *Leaflets* issued by the Botanic Garden have been valuable (Series XI [5], 1923; XIII [5–6], 1925; XV [11–12], 1927; XVI [4], 1928; XVI [10–11], 1928).

At the writer's suggestion, a joint field meeting of the American Fern Society, Ecological Society of America, Botanical Society of America, and the Torrey Botanical Club was held in connection with the Summer Meeting (June 21–23) of the Botanical Society of America in Syracuse. Members of these four organizations made special visits to some of the Hartstongue stations at Jamesville, New York.

At another fern field meeting, held with headquarters at Sparta, New Jersey, in August, one of the Hartstongue (*Scolopendrium vulgare*) plants raised at the Botanic Garden was installed in what it is hoped may prove an appropriate situation.

Respectfully submitted,

Ralph C. Benedict,
Resident Investigator (Ferns).

FINANCIAL STATEMENT FOR 1932

I. Tax Budget Accounts

1530 *Personal Service:* (*Regular Employees*)
1531 " " (*Temporary Employees*)

Appropriation	$ 82,660.00
Expended	82,660.00

Other Codes than Personal Service:

Code 1532 Fuel Supplies:

Appropriation	$ 3,500.00
Expended	3,500.00

Code 1533 Office Supplies:

Appropriation	$ 600.00
Expended	600.00

Code 1534 Laundry, Cleaning and Disinfecting Supplies:

Appropriation	$ 130.00
Expended	130.00

Code 1535 Botanical and Agricultural Supplies:

Appropriation	$ 2,750.00
Expended	2,750.00

Code 1536 Motor Vehicle Supplies:

Appropriation	$ 125.00
Expended	125.00

Code 1537 General Plant Supplies:

Appropriation	$ 450.00
Expended	450.00

Code 1538 Wearing Apparel:

Appropriation	$ 50.00
Expended	50.00

Code 1539 Office Equipment:

Appropriation	$ 150.00
Expended	150.00

Code 1540 General Plant Equipment:

Appropriation	$ 1,500.00
Expended	1,500.00

Code 1541 General Plant Materials:

Appropriation	$	1,750.00
Expended		1,750.00

Code 1542 Repairs and Replacements:

Appropriation	$	3,500.00
Expended		3,500.00

Code 1543 Light, Heat and Power:

Appropriation	$	500.00
Expended		500.00

Code 1544 Telephone Service

Appropriation	$	500.00
Expended		500.00

Code 1545 Carfares:

Appropriation	$	60.00
Expended		60.00

Code 1546 Expressage and Deliveries:

Appropriation	$	300.00
Expended		300.00

Code 1547 General Plant Service:

Appropriation	$	500.00
Expended		500.00

Code 1548 Contingencies:

Appropriation	$	100.00
Expended		100.00

Summary of Tax Budget Accounts:

Appropriated		
Personal Service	$	82,660.00
Other Codes		16,465.00
Total	$	99,125.00
Expended		99,125.00

II. Private Funds Accounts

1. *Endowment Fund* ($50,500.00) *Restricted:*

Income Account:		
Income 1932		$ 2,672.28
Transferred to Endowment Increment Fund	$ 267.23	
Transferred to Special Contributions	2,405.05	2,672.28
		$ 0.00

2. *Life Membership Fund* ($6,500.00) *Restricted:*

Income Account:		
Income 1932		$ 343.95
Transferred to Endowment Increment Fund	$ 34.40	
Transferred to Annual Membership Account	309.55	343.95
		$ 0.00

3. *George C. Brackett Library Fund* ($500.00) *Restricted:*

Income Account:		
Income 1932		$ 26.45
Expended	$ 23.81	
Transferred to Endowment Increment Fund	2.64	26.45
		$ 0.00

4. *Benjamin Stuart Gager Memorial Fund* ($13,417.20) *Restricted:*

Income Account:		
Balance, January 1, 1932	$ .15	
Income 1932	710.17	$ 710.32
Expended	$ 265.94	
Transferred to Endowment Increment Fund	71.02	
Transferred to John D. Rockefeller, Jr., Fund	369.20	$ 706.16
Balance, December 31, 1932		$ 4.16

5. *Martha Woodward Stutzer Memorial Fund* ($10,000.00) *Restricted:*

Income Account:		
Balance, January 1, 1932	$ 185.59	
Income 1932	529.17	$ 714.76
Expended	$ 229.52	
Transferred to Endowment Increment Fund	52.92	282.44
Balance, December 31, 1932		$ 432.32

* Restricted funds are those limited, by terms of gift, bequest, or solicitation, to the scientific and educational work of the Garden.

6. *Mary Bates Spalding Fund* ($2,697.00) *Restricted:*

Income Account:			
Balance, January 1, 1932		$ 17.15	
Income 1932		142.72	
Miscellaneous		24.10	$ 183.97
Expended	$ 50.00		
Transferred to Endowment Increment Fund	14.27		64.27
Balance, December 31, 1932			$ 119.70

7. *Alfred T. White Fund* ($243,149.27) *Restricted:*

Income Account:			
Income 1932			$ 12,866.64
Expended	$ 139.87		
Transferred to Endowment Increment Fund	1,286.66		
Transferred to Special Contributions	11,440.11		12,866.64
			$ 0.00

8. *A. Augustus Healy Bequest* ($9,798.31) *Restricted:*

Income Account:			
Income 1932			$ 518.48
Transferred to Endowment Increment Fund	$ 51.85		
Transferred to Special Contributions	466.63		518.48
			$ 0.00

9. *Robert B. Woodward Bequest* ($25,000.00) *Restricted:*

Income Account:			
Income 1932			$ 1,322.90
Transferred to Endowment Increment Fund	$ 132.29		
Transferred to Special Contributions	1,190.61		1,322.90
			$ 0.00

10. *Alfred T. White Memorial Tablet Fund* ($3,889.85) *Restricted:*

Income Account:			
Income 1932			$ 205.85
Transferred to Endowment Increment Fund	$ 20.58		
Transferred to Special Contributions	185.27		205.85
			$ 0.00

11. *Brooklyn Institute Centennial Fund B. B. G. Share* ($30,000.00) *Restricted:*

Income Account:			
Income 1932			$ 1,587.50
Transferred to Endowment Increment Fund	$ 158.75		
Transferred to Special Contributions	1,428.75		1,587.50
			$ 0.00

12. *John D. Rockefeller, Jr., Fund* ($250,000.00) *Restricted:*

Income Account:		
Balance, January 1, 1932	$ 2,457.69	
Income 1932	13,125.00	
Transferred from B. S. Gager Memorial Fund	369.20	
Transferred from Collections Fund	302.40	$ 16,254.29
Expended	$ 1,182.10	
Transferred to Endowment Increment Fund	1,312.50	
Transferred to Special Contributions	11,552.14	14,046.74
Balance, December 31, 1932		$ 2,207.55

13. *Citizens Endowment Fund* ($253,929.26) *Restricted:*

Income Account:		
Income 1932		$ 13,331.28
Transferred to Endowment Increment Fund	$ 1,333.13	
Transferred to Special Contributions	11,998.15	13,331.28
		$ 0.00

14. *Sustaining Membership. Restricted:*

Balance, January 1, 1932	$ 16.66	
Received from dues	549.81	$ 566.47
Transferred to Annual Membership Account		499.83
Balance, December 31, 1932		$ 66.64

15. *Annual Membership. Restricted:*

Balance, January 1, 1932	$ 476.40	
Received from dues 1932	6,275.00	
Transferred from Life Memb. Acct.	309.55	
Transferred from Sustaining Memb. Acct.	499.83	
Miscellaneous Receipts	40.12	$ 7,600.90
Expended	$ 6,351.60	
Transferred to Special Contributions	748.00	7,099.60
Balance, December 31, 1932		$ 501.30

16. *Tuition and Sales. Restricted:*

Balance, January 1, 1932	$ 4,657.60	
Received 1932		
a. Tuitions	2,341.80	
b. Seed Packets	6,660.21	
c. Sales	476.24	
d. Miscellaneous	162.00	$ 14,297.85
Expended	$ 4,792.38	

Transferred to Endowment Increment Fund..	808.71	
Transferred to Special Contributions.....	5,440.00	11,041.09
Balance, December 31, 1932.....		$ 3,256.76

17. *Botanic Garden Collections Fund 1932. Restricted:*

Received from Contributions.....	$ 6,142.00	
Miscellaneous	15.74	$ 6,157.74
Expended	$ 4,587.64	
Transferred to J. D. Rockefeller, Jr., Fund..	302.40	4,890.04
Balance, December 31, 1932.....		$ 1,267.70

18. *Special Fund (Brooklyn Institute General Endowment Income: Annual Allotment) Restricted:*

Cancelled for Brooklyn Botanic Garden as of January 1, 1932.

19. *Cary Library Fund* ($10,000.00—1/5 *of Income to Brooklyn Botanic Garden) Restricted:*

Balance, January 1, 1932.....	$ 44.77	
Income Allotment 1932.....	105.83	$ 150.60
Expended	$ 111.83	
Transferred to Endowment Increment Fund..	10.58	122.41
Balance, December 31, 1932		$ 28.19

20. *Henry W. Healy Trust Fund* ($231,977.17—1/4 *of Income to Brooklyn Botanic Garden) Restricted:*

Balance, January 1, 1932.....	$ 156.35	
Income 1932	2,382.87	$ 2,539.22
Transferred to Endowment Increment Fund..	$ 238.29	
Transferred to Special Contributions.....	2,300.93	2,539.22
		$ 0.00

21. *Mrs. Henry C. Folger Fund* ($1,000.00) *Restricted:*

Income Account:

Balance, January 1, 1932.....	$ 46.96	
Income 1932	52.89	$ 99.85
Expended	$ 75.00	
Transferred to Endowment Increment Fund	5.29	80.29
Balance, December 31, 1932.....		$ 19.56

22. Special Purposes. Restricted by Terms of Gifts:			
Balance, January 1, 1932		$ 605.49	
Received:			
a. Anonymous for Japanese Garden		1,000.00	
b. Special Gifts for Children's Work		14.43	
c. Bronze Tablets for Glacial Boulders		150.00	
d. Bernard Goodman Memorial		135.00	
e. Miscellaneous		65.00	$ 1,969.92
Expended			1,148.09
Balance, December 31, 1932			$ 821.83
23. Plant Pathology Research Fund. Restricted:			
Balance, January 1, 1932		$ 784.03	
Income 1932		7,507.70	$ 8,291.73
Expended		$ 788.45	
Transferred to Special Contributions		7,500.00	8,288.45
Balance, December 31, 1932			$ 3.28
24. Special Contributions (for 1932 only). Restricted:			
Balance, January 1, 1932		$ 528.17	
Anonymous		120.00	
Contributed by Staff to Emergency Unemployment Relief Fund		1,322.15	
Salary Rebate		269.21	
Miscellaneous		120.00	
Transferred from			
Endowment Fund Income Account		2,405.05	
Alfred T. White Fund Income Account		11,440.11	
A. Augustus Healy Bequest Income Account		466.63	
R. B. Woodward Bequest Income Account		1,190.61	
A. T. White Memorial Tablet Fund Income Account		185.27	
Brooklyn Inst. Centennial Fund Income Account		1,428.75	
J. D. Rockefeller, Jr., Fund Income Account		11,552.14	
Citizens Endowment Fund Income Account		11,998.15	
Annual Membership Account		748.00	
Tuition and Sales		5,440.00	
Henry W. Healy Trust Fund		2,300.93	
Plant Pathology Research Fund		7,500.00	$ 59,015.17
Expended			56,865.77
Balance, December 31, 1932			$ 2,149.40

25. *Endowment Increment Fund* ($114,756.76) *Restricted:*			
Transferred from other accounts 1932		$ 5,801.11	
Interest 1932		5,617.25	$ 11,418.36
Transferred to Principal			11,418.36
			$ 0.00
Summary of Private Funds Accounts:			
Balances, January 1, 1932		$ 9,977.01	
Income 1932		89,603.34	$ 99,580.35
Expended		$77,283.60	
Transferred to Endowment Increment Fund Principal		11,418.36	88,701.96
Balances, December 31, 1932			$ 10,878.39

III. Summary of Total Maintenance Budget for 1932

Income			
Tax Budget Appropriation, 49.9%		$99,125.00	
Private Funds Budget, 50.1%		99,580.35	
Total			$198,705.35
Transferred to Endowment Increment Fund Principal			11,418.36
Available			$187,286.99
Expended			
Personal Service			
Tax Budget	$82,660.00		
Private Funds	56,865.77		
Total		$139,525.77	
Other than Personal Service			
Tax Budget	$16,465.00		
Private Funds	20,417.83		
Total		$ 36,882.83	$176,408.60
Balance, December 31, 1932			$ 10,878.39

Respectfully submitted,

Daniel C. Downs,

Secretary and Accountant.

Note:—The preceding "Financial Statement" is a transcript of Brooklyn Botanic Garden accounts in the books of the Treasurer of the Brooklyn Institute of Arts and Sciences. The Treasurer's accounts are audited annually by a Public Accountant, and a separate audit of this "Financial Statement" is not made in order to save unnecessary expense.

EDWIN P. MAYNARD,
Treasurer.

IV. TAX NOTES FOR PERMANENT IMPROVEMENTS

N.D.P. 212Q—Completion of improvement of Plaza of Brooklyn Botanic Garden, including construction of underground storage room for tools and bulbs. (Including Architects' Fees.)

Appropriation				$ 21,000.00
Expended				
	1930	*1931*	*1932*	
Architects' Fees	$ 1,160.79	$ 304.33	$ 0.00	
Improvement Work	15,477.20	3,400.00	655.00	
Totals	$16,637.99	$3,704.33	$655.00	20,997.32
Balance, December 31, 1932				$ 2.68

N.D.P. 212T—General Improvement of Land lying east of Mt. Prospect Reservoir fronting on Eastern Parkway, including Architects' Fees.

Appropriation		$ 24,100.00
Expended to December 31, 1932	$ 551.97	
Rescinded April 1, 1932	22,368.65	22,920.62
Balance, December 31, 1932		$ 1,179.38

Certified as correct,

EDWARD S. RYAN, *Chief Clerk,*
Department of Parks, Borough of Brooklyn.

APPENDIX 1

GIFTS RECEIVED DURING 1932

Collections Fund

Frank L. Babbott
Mrs. Frank L. Babbott, Jr.
Mrs. Louise T. Beardsley
Mrs. George M. Boardman
Brooklyn Woman's Club
Mrs. Armin E. Brunn
Miss Jeannette Clark
Colonial Daughters of the 17th Century
Mrs. Walter V. Cranford
Mrs. Mary Childs Draper
Dugan Brothers
Otto Ebel
Walter Ebel
Miss Adele F. Emerson
Mrs. Sumner Ford
John W. Frothingham
Glen Ridge Woman's Club, Garden Department
Mrs. Herbert F. Gunnison
William T. Hunter
Miss C. Julie M. Husson
Edward A. Ingraham
* Alfred W. Jenkins
* Mrs. Thomas B. Littlejohn
Miss Hilda Loines
Long Island Federation of Women's Clubs
Mrs. William W. Marshall
Mrs. Edwin P. Maynard
Mrs. Charles E. Perkins
Miss Julia J. Pierrepont
Mrs. James H. Post
Mrs. William A. Putnam
Mrs. B. Herbert Smith
Herbert S. Smith
Mrs. Seth Thayer Stewart
Herman Stutzer
Mrs. Mary Van Norden
Miss Frances E. White
Miss Harriet H. White
"C. W."
Peter Piper Wright (A dog)

Japanese Garden

Anonymous $1,000.00

Special Gifts for Children's Work

Mrs. Joseph Goodman..... $ 14.43

Bronze Tablets for Glacial Boulders

Edward C. Blum..... $ 150.00

Bernard Goodman Memorial

Joseph Goodman ..... $ 135.00

* Deceased.

Miscellaneous

Anonymous	$	95.00
Dr. S. Parkes Cadman (For Labor)		10.00
National Society, D.A.R., New York State Organization		50.00
Mrs. William A. Putnam (For Labor)		15.00
Woman's Auxiliary, Brooklyn Botanic Garden		24.61
Women of '76 Chapter, N.S.D.A.R.		15.00

Living Plants

Mrs. George Arents, Jr., New York City, 1 *Clivia miniata.*

Mr. Frank Bailey, Munnysunk Nursery, Locust Valley, N. Y., 3 *Ilex Pernyi.*

Mr. Herman Becker, Brooklyn Botanic Garden, 15 native plants.

Dr. Abraham Bernhardt, Brooklyn, 11 plants and 11 cuttings of cacti and succulents.

Mrs. Frederick S. Bloss, Brooklyn, 2 *Muscari comosum.*

Bobbink & Atkins, Rutherford, N. J., 59 plants of Roses.

Brecks Nurseries, Lexington, Mass., 3 plants of *Aster hybridus luteus.*

Mrs. Charles C. Brooks, Tennessee, 15 plants of *Conradina.*

Conard-Pyle Co., West Grove, Pa., 39 plants of ten rose varieties.

Mr. H. A. Dreer, Philadelphia, 9 rose plants.

Mr. Max Elwert, New York City, 46 miscellaneous plants.

Farr Nursery Co., Weiser Park, Pa., 1 graft of *Syringa oblata.*

Mr. Clarence L. Hay, American Museum of Natural History, 6 clumps of *Rhododendron roseum.*

Mr. L. A. Hausman, N. J. College for Women, 1 phial of *Wolffia columbiana.*

Mrs. Prescott Hoard, Mt. Vernon, N. Y., 1 purple flowered form of Lily-of-the-Valley.

Miss C. Julie M. Husson, Brooklyn, 285 bulbs of *Narcissus poeticus* fl. pl.

Mrs. Clarence R. Hyde, Brooklyn, 6 *Gaultheria procumbens.*

Jackson & Perkins Co., Newark, New York, 35 rose plants.

Mr. B. A. Krukoff, The George W. Cole Co., 2 *Copernicia cerifera.*

Mr. W. A. Manda, South Orange, N. J., 63 plants for the conservatories, including many cacti and succulents.

Meissner Flower Shop, 3 plants of double-flowering cherry.

Mr. F. D. Osman, New Brunswick Nurseries, N. J., 7 rose plants.

Dr. C. Osten, Uruguay, 5 *Gunnera Herteri.*

Mrs. Charles Pashley, Brooklyn, 10 rose plants.

Mrs. W. Sterling Peters, Brooklyn, 1 plant of fragrant, climbing *Lonicera.*

Mrs. Mary O. Petrocelli, Brooklyn, 4 native plants.

Mr. G. L. Sampson, Brooklyn, 3 *Cydonia japonica.*

Max Schling, Inc., New York City, 2 *Erythrina Crista-galli.*

Mr. G. C. Stone, Brooklyn, 2 bulbs of Red Squill.

Mr. Clarence Sutcliffe, Poughkeepsie, N. Y., 6 *Viola striata.*

Mr. C. J. Svenson, Malden, Mass., 36 native plants.
Mr. Lawrence Tannenbaum, Ithaca, N. Y., 56 native plants.
Miss Venetia Taylor, Brooklyn, 1 clump of *Orobanche uniflora*.
William Tricker, Inc., Saddle River, N. J., 19 varieties of *Nymphaea*.
Miss Watt, School of Horticulture, Ambler, Pa., 1 *Veronica catarractae* var. *irrigans*.
Mrs. F. J. Whiting, Sudbury, Mass., 2 Dwarf Goldenrod.
Mr. G. E. Wohlert, The Garden Nurseries, Narberth, Pa., 1 *Prunus cam-panulata*.

Seeds

Mr. Herman Becker (75)
Dr. Abraham Bernhardt (6)
Dr. C. J. Chamberlain (2)
Miss Margaret Cranford (2)
Dr. Leon Croizat (5)
Mr. Otto Edler (1)
Mr. Max Elwert (1)
Mrs. Robert H. Fife (19)
Mr. Clement Heaton (1)
Mrs. Clarence R. Hyde (165)
Dr. Duncan S. Johnson (1)
Dr. A. D. McGavock (6)
Mr. W. Moses (1)
Dr. Charles L. Pollard (2)
Mrs. R. P. C. Sanderson (2)
Mr. Aaron J. Sharp (23)

Phanerogamic Herbarium

Dr. R. C. Benedict, 3 specimens.
Mr. C. C. Deam, 8 specimens.
Dr. D. Demaree, 169 specimens.
Dr. J. A. Drushel, 111 specimens.
Dr. G. P. Engelhardt, 1 specimen.
Mr. K. K. Mackenzie, 17 specimens.
Dr. Gunnar Samuelsson, 1 specimen.
Mr. H. P. Ulich, 50 specimens.

Cryptogamic Herbarium

Mr. C. J. Svenson, 50 specimens.

Library

Books

Antevs, Dr. Ernst, New York, N. Y..... 1
Barnes, Miss C. W., Brooklyn, N. Y..... 3
Black, Hon. Loring M., Washington, D. C..... 1
Botaniska Institutionen, Upsala, Sweden..... 1
Carnegie Institution of Washington, Washington, D. C..... 14
Chichester, Mrs. Emilie P., Brooklyn, N. Y..... 1
Chosen, Forest Experiment Station, Keijo..... 1
College of Physicians, Library, Philadelphia, Pa..... 1

Comitato Italiano per lo Studio dei Problem della Popolazione, Rome, Italy	3
Domin, Dr. Karel, Prague, Czechoslovakia	1
Donnelly, Mr. John F., Cambridge, Mass.	1
Dorward, Miss Margaret M., Brooklyn, N. Y.	1
Gager, Dr. C. Stuart, Brooklyn, N. Y.	42
Gager, Mrs. C. Stuart, Brooklyn, N. Y.	1
Graves, Dr. Arthur Harmount, Brooklyn, N. Y.	1
Hyde, Mrs. Clarence R., Brooklyn, N. Y.	8
Kimball, Mr. Henry R., Brooklyn, N. Y.	1
Knoche, Dr. Herman, San José, Calif. and Mr. Leon Lhomme, Douelle, France	4
Lemée, Dr. Albert, Brest, France	1
Mackenzie, Mr. Kenneth K., New York, N. Y.	3
Marine Biological Laboratory, Woods Hole, Mass.	5
Metcalfe, Miss Kathleen, Brooklyn, N. Y.	1
Myerson, Miss Elizabeth, Brooklyn, N. Y.	1
Nebraska State Horticultural Society, Lincoln, Neb.	1
New Jersey State Horticultural Society, New Brunswick, N. J.	1
Nichols, Miss Helene, Manhasset, N. Y.	1
Oppenheim, Mrs. William W., Orange, N. J.	1
Over, Mr. William H., Vermillion, S. D.	1
Patterson, Miss Mabel, Brooklyn, N. Y.	24
Public School 89, Greenhouse Class 1932, Brooklyn, N. Y.	1
Public School 183, Brooklyn, N. Y.	1
Sanford, Dr. A. F., Knoxville, Tenn.	2
Shaw, Miss Ellen Eddy, Brooklyn, N. Y.	1
Société d'Histoire Naturelle de l'Afrique du Nord, Algiers	1
Svenson, Dr. Henry K., Brooklyn, N. Y.	2
Swedish State Institute for Race Biology, Upsala, Sweden	1
K. Vetenskapsakademiens Bibliotek, Stockholm, Sweden	1
White, Miss Harriet H., Brooklyn, N. Y.	2
Total	138

PAMPHLETS

Ames, Prof. Oakes, Cambridge, Mass.	3
Bartlett Tree Expert Company, Stamford, Conn.	2
Benedict, Dr. Ralph Curtiss, Brooklyn, N. Y.	1
Blaksley Botanic Garden, Santa Barbara, Calif.	1
Briquet, Mme. John, Geneva, Switzerland	1
Brown, Mr. Charles H., Ames, Iowa	1
Burrows, Dr. M. T., Pasadena, Calif.	1
Caparn, Mr. Harold A., New York, N. Y.	1
Carnegie Institution of Washington, Washington, D. C.	1

Carnegie Institution of Washington, Department of Genetics, Cold Spring Harbor, L. I. 27
Central Experimental Farm, Ottawa, Ont. 1
Cheney, Prof. Ralph H., Brooklyn, N. Y. 3
Cook, Dr. Melville T., Rio Piedras, P. R. 1
Cornell University, Department of Plant Pathology, Ithaca, N. Y. 12
Correns, Dr. Carl, Berlin, Germany 1
Crider, Dr. Franklin J., Superior, Ariz. 1
Domin, Dr. Karel, Prague, Czechoslovakia 6
Dragone-Testi, Dr. Giuseppina, Rome, Italy 4
Eames, Dr. Arthur J., Ithaca, N. Y. 1
Eastwood, Miss Alice, San Francisco, Calif. 2
Escola Superior de Agricultura e Veterinaria, Viçosa, Brazil 2
Fulton, Dr. H. R., Washington, D. C. 2
Gager, Dr. C. Stuart, Brooklyn, N. Y. 181
Gates, Prof. R. Ruggles, London, England 4
Gratz University, Pflanzenphysiologisches Institut, Gratz, Austria 3
Graves, Dr. Arthur Harmount, Brooklyn, N. Y. 2
Harper, Dr. Roland M., University, Ala. 1
Harrison, Dr. Carrie, Washington, D. C. 6
Hédin, M. Louis, Paris, France 5
Henry E. Huntington Library, San Marino, Calif. 1
Howe, Dr. Marshall A., New York, N. Y. 5
Hyde, Mrs. Clarence R., Brooklyn, N. Y. 5
John Bartram Celebration Committee, Philadelphia, Pa. 1
Kitamura, Mr. Siro, Kyoto, Japan 1
Kittredge, Miss E. M., Vergennes, Vt. 1
Long-Bell Lumber Company, Longview, Wash. 1
Maxon, Dr. William R., Washington, D. C. 5
Merrill, Dr. M. C., Washington, D. C. 3
Michigan, University of. School of Forestry and Conservation, Ann Arbor, Mich. 1
Mumford, Dr. F. B., Columbia, Mo. 1
National Electric Light Association, New York, N. Y. 1
New York State Conservation Department, Division of Parks 1
Nilsson, Dr. N. H., Lund, Sweden 8
Osten, Dr. C., Montevideo, South America 1
Persidsky, Prof. D., Kiew, U. S. S. R. 1
Pesola, Dr. Vilho A., Jokioinen, Finland 8
Purdy, Miss Maud H., Brooklyn, N. Y. 9
Raper, Mr. Kenneth B., Washington, D. C. 1
Rendle, Dr. A. B., Surrey, England 1
Rockefeller Institute for Medical Research, New York, N. Y. 15
Rothamsted Experimental Station, Harpenden, Herts, England 3
St. John, Dr. Harold, Honolulu, Hawaii 4
Saunders, Miss Edith R., Cambridge, England 3

Shaw, Miss Ellen Eddy, Brooklyn, N. Y.	3
Sherff, Dr. E. E., Chicago, Ill.	19
Silvestri, Prof. F., Portici, Italy	1
Spingarn, Mr. J. E., Amenia, N. Y.	1
Stewart, Dr. L. B., Edinburgh, Scotland	1
Studhalter, Mr. R. A., Lubbock, Texas	1
Suringar, Dr. J. Valckenier, Wageningen, Netherlands	10
Tennessee, University of, Department of Botany, Knoxville, Tenn.	1
Thomen, Dr. A. A., New York, N. Y.	7
Verdoorn, Mr. Fr., Utrecht, Netherlands	2
Weller, Dr. D. M., Honolulu, Hawaii	7
Wille, Mr. J. I., Brooklyn, N. Y.	1
Total	412

Parts of Publications

(*Exclusive of Government Documents*)

American Horticultural Society, Washington, D. C.	5
American Museum of Natural History, New York, N. Y.	2
Ames, Prof. Oakes, Cambridge, Mass.	2
Argentina, Ministerio de Agricultura, Buenos Aires	3
Bailey, Prof. Liberty Hyde, Ithaca, N. Y.	1
Bernice P. Bishop Museum, Honolulu, Hawaii	6
Botaniska Institutionen, Upsala, Sweden	1
Camden Argus, Camden, N. J.	1
Canada, British Columbia. Provincial Museum of Natural History	1
Carnegie Institution of Washington, Washington, D. C.	3
Carnegie Institution of Washington, Department of Genetics, Cold Spring Harbor, L. I.	1
Cincinnati, University of, Basic Science Research Laboratory	2
City Gardens Club, New York, N. Y.	1
Colorado, University of, Boulder, Col.	12
Cuba, Secretaria De Agricultura, Comercio y Trabajo, Havana	11
Danmarks Naturfredningsforening, Copenhagen, Denmark	1
Domin, Dr. Karel, Prague, Czechoslovakia	1
Draper, Mrs. J. W., Hastings-on-Hudson, N. Y.	1
Eastwood, Miss Alice, San Francisco, Calif.	1
Fisher Scientific Company, Pittsburgh, Pa.	13
Florida Entomological Society, Gainesville, Fla.	3
Flushing Garden Club, Flushing, L. I.	2
Free, Mr. Montague, Brooklyn, N. Y.	10
Gager, Dr. C. Stuart, Brooklyn, N. Y.	161
Hawaii, Commissioners of Agriculture and Forestry, Honolulu	4
Hokkaido Government, Sapporo, Japan	1
Hyde, Mrs. Clarence R., Brooklyn, N. Y.	42

Idaho University. School of Forestry, Moscow, Idaho	1
Imperial Bureau of Plant Genetics, Aberystwyth, Wales	6
L'Institut Pasteur d'Algérie, Algiers	1
Jenkins, Mr. Alfred W., Brooklyn, N. Y	1
Jenkins, Mr. Charles F., Philadelphia, Pa	1
Jessen, Dr. Knud, Copenhagen, Denmark	4
Kenya Colony and Protectorate, Forest Department, Africa	1
Lenin Academy of Agricultural Sciences in U. S. S. R., Moscow	9
McFarland Organizations, Harrisburg, Pa	2
Maine, University of, Library, Orono, Me	1
Mansfield, Miss Louise, Brooklyn, N. Y	1
Massachusetts Institute of Technology, Boston, Mass	1
Medical Society of the County of Kings, Brooklyn, N. Y	13
Meguro Forestry Experimental Station, Meguro, Tokyo, Japan	1
Mississippi State Plant Board, A. & M. College, Miss	2
National Plant, Flower and Fruit Guild, New York, N. Y	4
National Research Council, Washington, D. C	4
National Research Council of Japan, Tokyo, Japan	2
New York Academy of Medicine	1
New York Public Library	1
Phytogeographical Society, Kyoto, Japan	1
Porto Rico, Department of Agriculture and Commerce, San Juan	3
Porto Rico, Insular Experiment Station, Rio Piedras	1
Purdy, Miss Maud H., Brooklyn, N. Y	212
Queensland Provisional Forestry Board, Australia	2
Reed, Dr. George M., Brooklyn, N. Y	52
Riverside Junior College, Riverside, Calif	1
Roosevelt Wild Life Forest Experiment Station, Syracuse, N. Y	2
Rothamsted Experimental Station, Harpenden, Herts, England	1
Salvador, Ministerio de Agricultura, San Salvador	1
School Garden Association of New York	7
Shaw, Miss Ellen Eddy, Brooklyn, N. Y	3
Sociedad Española de Historia Natural, Madrid, Spain	6
Spaulding, Dr. Perley, Amherst, Mass	1
Taber, Mrs. D. Sherman, Flushing, L. I	1
Taihoku Imperial University, Formosa, Japan	19
Tennessee, University of, Department of Botany, Knoxville, Tenn	3
Tohoku Imperial University, Sendai, Japan	4
Towson Nurseries, Towson, Md	8
Union College, Schenectady, N. Y	1
K. Vetenskapsakademiens Bibliotek, Stockholm, Sweden	1
West Virginia Academy of Science, Morgantown, W. Va	1
White, Miss Harriet H., Brooklyn, N. Y	15
Wien. Bundesanstalt für Pflanzenschutz	1
Wild Flower Preservation Society, Washington, D. C	4
Wille, Mr. J. I., Brooklyn, N. Y	5

Yale University. School of Forestry, New Haven, Conn.	6
Zulueta, Mr. Antonio de, Madrid, Spain	4
Total	715

PORTRAITS AND PHOTOGRAPHS

Appleman, Dr. C. O., Baltimore, Md.	1
Blackman, Dr. F. F., Cambridge, England	1
Chodat, Dr. F., Geneva, Switzerland	1
Eastwood, Miss Alice, San Francisco, Calif	1
Finn, Prof. Wladimir W., Kiew, U. S. S. R.	1
Gager, Dr. C. Stuart, Brooklyn, N. Y.	50
Harvey, Dr. R. B., St. Paul, Minn.	3
Koernicke, Dr. Max, Bonn Poppelsdorf, Germany	2
Maxon, Dr. William R., Washington, D. C.	1
Rose, Miss, Washington, D. C.	1
Total	62

Note: Three other portraits received as gifts from Professors H. H. Bartlett, C. H. Ostenfeld, and F. M. Andrews in 1927, 1928 and 1931 respectively, were deposited in the library in March, 1932.

AUTOGRAPH LETTERS

Gager, Dr. C. Stuart, Brooklyn, N. Y.	71

MISCELLANEOUS

National Wholesale Druggists' Association, New York, N. Y., 1 Map.
Gager, Dr. C. Stuart, Brooklyn, N. Y., 1 Wooden Pestle and Mortar.

For the Department of Elementary Instruction

American Sugar Refining Company, Exhibit of sugar for use in classwork.
Anonymous, $20.00 for extra help in the outdoor garden.
Blatt, Miss Natalie, One jig-saw puzzle for the children's clubroom.
Brunswick, Master Sanford, $1.00 for the children's clubroom library.
Bureau of Coffee Information, Exhibits for use in children's classes.
Butler, Mrs. Glentworth R., One prize cup competed for by the girls in the outdoor garden. One steel engraving for the children's clubroom. One picture for the children's garden house.
Cary, Mrs. William, One Wardian case.
deWildt, Mr. Hugo, Six shrubs for the children's formal garden.
Dorward, Miss Margaret M., One book for the children's clubroom library.
Duckham, Mr. William C., One dozen delphinium plants for the children's garden.

Flatbush Garden League (through Mrs. E. L. Carson), One prize book for the greatest improvement made by a first year boy or girl in the outdoor garden.

Gager, Dr. C. Stuart, One mortar and pestle for use in the children's classes. Nine books for the children's clubroom library.

Gager, Mrs. C. Stuart, One book for the children's clubroom library.

Garden Class of P. S. 89, $3.00 for the children's clubroom library.

Garden Teachers' Association, One prize cup competed for by the boys in the outdoor garden.

General Lord Stirling Society, Children of the American Revolution, $5.00 for the children's clubroom.

Godchaux Sugar Company, Inc., Exhibits of sugar for use in classwork.

Goodman, Mr. and Mrs. Joseph, $135.00 in memory of Bernard Goodman. One clock for the children's garden house. One hundred unmounted calendars for the children's work.

Iffla, Miss Florence, $5.00 for the children's work.

Jung, Miss Thekla, $5.00 for the children's clubroom.

Levine, Miss Roberta, One jig-saw puzzle for the children's clubroom.

McCall Company, The, Twelve photographic negatives of pictures illustrating articles on gardening.

Morgan, Mrs. Margaret, $150.00 for salaries for assistance in the children's garden for 1932.

Mothers of Saturday Morning Pupils, One jig-saw puzzle for the children's clubroom.

Myerson, Miss Betty, One book for the children's clubroom library.

Nichols, Miss Helene, One book for the children's clubroom library.

Shaw, Miss Ellen Eddy, One year's subscription to children's English newspaper for the children's clubroom. One book for the children's clubroom library. Two gold honor pins for honorable service in the out-door garden.

Smalley, Master Melvin, One jig-saw puzzle for the children's clubroom.

Taffae, Master David, $1.00 for the children's clubroom library.

United States Rubber Company Plantations, Inc., One bottle of latex and specimens of rubber for use in children's classes.

Van Zonneveld Brothers and Philippo, N. V., One hundred bulbs of Narcissus *Campernelle Giganteum.*

Woodwork Class of P. S. 90, Greenhouse implements.

Miscellaneous

Barnes, Miss C. W., 5 scrap books.

Bausch & Lomb Optical Co., 3 framed reproductions of oil paintings.

Beers, Dr. Nathan T., 3 motion picture reels.

Benedict, Dr. R. C., 3 photographs of plants.

Boys and Girls Club, $50 for Boulder Hill tablet.

Caparn, Mr. Harold A., 1 half-tone reproduction of engraving of Elgin Botanic Garden.

Cleveland, Mr. Charles, 1 bird house.
Department of Parks, Brooklyn (James J. Browne, Commissioner), 100 loads of leaves.
Frazee, Mr. V. L., 2 nuts of *Castanea dentata*.
Hyde, Mrs. Clarence R., 28 drawings of insect galls.
Loines, Miss Hilda, 1/2 pint seeds of *Castanea dentata*.
Martin, Mrs. Everett P., Gavel made from wood of Cedar of Lebanon.
Montgomery, Mr. Frank A., 1 photograph of Venus Flytrap.
Purdy, Miss Maud, 1 bookcase, 1 drawing table, 1 coat tree, and 1 screen.
Stern, Dr. Bernhard, 2 fruits of the Osage Orange.
Swift, Mrs. Oscar W., 1 lantern slide.
Thatcher, John & Son, 5 lbs. Minwax Caulking Compound.
Yokohoma Nursery Co., Japan, Services in growing and forwarding Irises collected in Japan by Dr. Reed.
Young, Hon. Richard, 1 bird bath.
Zilver, Mr. L., 50 photographs of views in Brooklyn Botanic Garden.

APPENDIX 2

PUBLICATIONS BY THE BOTANIC GARDEN PERSONNEL DURING 1932

Benedict, Ralph C.

Plant breeding: new and old. *The Teaching Biologist* **1**: No. 4. January.
Another fern list. *Amer. Fern Jour.* **22**: 25. January–March.
Review: Stockard, Prof. Charles R. Physical basis of personality. W. W. Norton & Co., Inc. 1932. *The Teaching Biologist* **1**: No. 5. February.
Report of the Resident Investigator (Ferns) for 1932. *Brooklyn Bot. Gard. Record* **21**: 106–108. March.
Review: Cannon, W. B. The wisdom of the body. W. W. Norton & Co., Inc. 1932. *The Teaching Biologist* **1**: No. 7. April.
Note on Botrychium. *Amer. Fern Jour.* **22**: 58–59. April–June.
Two valuable books for the biology teacher. *The Teaching Biologist* **1**: No. 8. May.
Review: Mann, Paul B. & Hastings, George T. Out-of-doors. Henry Holt & Co. *The Teaching Biologist* **1**: No. 9. June.
Review: Lawton, Elva. Regeneration and induced polyploidy

in ferns. *Amer. Jour. Bot.* **19**: 303–333. *Amer. Fern. Jour.* **22**: 93–94. July–September.

Review of three books on Florida ferns by John K. Small. *Amer. Fern Jour.* **22**: 94–95. July–September.

The color of the young royal fern leaves. *Amer. Fern Jour.* **22**: 100. July–September.

Review: Howard, L. O. The insect menace. The Century Co. *The Teaching Biologist* **2**: No. 2. November.

Caparn, Harold A.

Popular botany and botanic gardens. *Landscape Architecture* **22**: 81–88. January.

The planning of a botanic garden. *Landscape Architecture* **22**: 261–269. July.

Free, Montague

Fruit trees in the garden. *New York Sun.* February 6.

Report of the Horticulturist and Head Gardener for 1931. *Brooklyn Bot. Gard. Record* **21**: 92–98. March.

March in your garden. *Brooklyn Bot. Gard. Leaflets* **XX**[1]. March 16.

Garden gems. *McCall's Magazine.* April.

April in your garden. *Brooklyn Bot. Gard. Leafllets* **XX**[2]. April 13.

May in your garden. *Brooklyn Bot. Gard. Leaflets* **XX**[3]. May 4.

Tulipa kaufmanniana. *Gardener's Chronicle of America* **36**: 190. May.

A pigmy narcissus. *Gardener's Chronicle of America* **36**: 191. May.

June and July in your garden. *Brooklyn Bot. Gard. Leaflets* **XX**[5]. June 22.

Summer in the rock garden. *New York Sun.* June 25.

The summer pruning of roses. *New York Sun.* July 23.

House plants. *National plant, Flower and Fruit Guild Magazine.* September.

October in your garden. *Brooklyn Bot. Gard. Leaflets* **XX**[6]. October 19.

Review: Gabrielson, I. N. Western American alpines. Macmillan, New York. 1932. *New York Sun.* November 19.

Gager, C. Stuart

Botanic gardens and art. *Pamphlet,* pp. 1–7. March.

Annual report of the Brooklyn Botanic Garden: Report of the director. *Brooklyn Bot. Gard. Record* **21**: 41–77. March.

Botanical opportunities for college women. *Alumnae Bulletin* of Adelphi College Alumnae Assoc. **2**: 1–4. June.

The foundational literature of botany. [Abstract of lecture.] *The Teaching Biologist* **2**: 1 and 4. December.

Gager, C. Stuart [and **Antevs, Ernst**]. The story of our boulders: Glacial geology of the Brooklyn Botanic Garden. *Brooklyn Bot. Gard. Record* **21**: 165–207. May.

Graves, Arthur Harmount

Forest pathology. Breeding work with the chestnut during 1931. *Brooklyn Bot. Gard. Record* **21**: 46–53. March.

Report of the Curator of Public Instruction for 1931. *Brooklyn Bot. Gard. Record* **21**: 63–75. March.

Can we bring back the chestnut? *University of the State of New York Bulletin to the Schools* **18**[14]: 214–217. April.

39 newspaper articles relating to the Brooklyn Botanic Garden.

Four abstracts in *Biological Abstracts.*

Gundersen, Alfred

Report of the Curator of Plants for 1931. *Brooklyn Bot. Gard. Record* **21**: 80–85. March.

Flower buds and the direction of floral evolution. *Torreya* **32**: 154–158. November–December.

Reed, George M.

Beardless iris test garden. *Amer. Iris Soc. Bull.* **42**: 70–72. January.

Inheritance of resistance to loose and covered smut in a hybrid of Early Gothland and Victor oats. *Amer. Jour. Bot.* **19**: 194–203. February.

Inheritance of resistance to loose and covered smut in hybrids of Hull-less with Early Gothland and Monarch oats. *Amer. Jour. Bot.* **19**: 273–301. March.

Plant pathology. *Brooklyn Bot. Gard. Record* **21**: 42–46. March.

Beardless iris project. *Brooklyn Bot. Gard. Record* **21**: 54–58. March.

Inheritance of resistance to loose and covered smuts in hybrids between certain susceptible oat varieties and Black Mesdag. *Proc. Sixth Internat. Congress of Genetics* **2**: 164–165. August.

Reed, George M. and Bunkio Matsuki

Album of Hana-shōbu by Doctor Miyoshi. A translation. *Amer. Iris Soc. Bull.* **44**: 3–29. July.

Reed, George M. and T. R. Stanton

Physiologic races of Ustilago levis and U. Avenae on red oats. *Jour. Agr. Res.* **44**: 147–153. January.

Shaw, Ellen Eddy

Spiritual benefits through nature guiding. *Bulletin of the Garden Club of America.* March.

Report of the Curator of Elementary Instruction. *Brooklyn Bot. Gard. Record* **21**: 75–80.

Gardens for children, a civic factor. *Bulletin of The University of the State of New York* **18**: 229–231. April.

Visiting the Brooklyn Botanic Garden. *Bulletin of the Department of Elementary School Principals, The Eleventh Yearbook* **11**: 476–481. April.

A gift garden. *The National Plant, Flower and Fruit Guild Mag.* **21**: 15–16. May.

Nature education at the Brooklyn Botanic Garden. *Addresses and Proceedings of the Seventieth Annual Meeting of the National Education Association* **70**: 474–475. November.

The following articles appeared in *McCall's Magazine* in the issues indicated:

A thumb-nail garden guide. February.

Spring planting of roses. March.

The beginner's rock garden. April.

The gardener's picture book of flower novelties for 1932. June.

Indoor bulb culture. September.

The following articles appeared in *New Jersey Gardens* as indicated:

Shrubs. March.
Soil fertility. April.
Planting the annual flower garden. May.
Maintenance and support of the Garden. July.
August in the Garden. August.

The following 44 articles appeared in the *New York Sun* on the dates indicated:

What to do with our holiday plants. January 2.
Care of blossoming bulbs. January 9.
More cuttings. January 16.
Umbrella plants and how to raise them. January 23.
Division of plants. January 30.
The seed catalog: choices for beginners. February 6.
The seed catalog: novelties for the garden. February 13.
How to start seedlings. February 20.
Garden plans. February 27.
Shrubs for the small garden. March 5.
Transplanting seedlings. March 12.
Roses for our garden. March 19.
Have you planted your annuals? (Vegetable seedlings.) March 26.
How about a little vegetable garden? April 2.
How to make a lawn. April 9.
Preparation of the garden bed. April 16.
Plants of special interest. April 23.
Planting the vegetable garden. April 30.
Planting and transplanting. May 7.
Planting the flower garden. May 14.
Foundation plants. May 21.
Bedding plants. May 28.
Color in the garden. June 4.
Enemies of our garden. June 11.
Checking up the flower garden. June 18.
What to do next in the garden. June 25.
The flower garden—some of our favorites. July 2.
Planting perennials for next year. July 9.

More about dahlias. July 16.
A midsummer check-up. July 23.
Shrubs to choose for fall planting. July 30.
Flowers: how to pick and arrange them. August 6.
Planting of evergreens. August 13.
Pick out your bulbs for fall planting. August 20.
The starting of cuttings for house plants. August 27.
How to pot plants for indoor culture. September 3.
Color in the fall garden. September 10.
Making of the bulb bed. September 17.
Fall planting of roses. September 24.
Potting bulbs for indoor pleasure. October 1.
Potting chrysanthemums for next year. October 8.
A few good house plants. October 15.
A window garden. October 22.
House plants—their care. October 29.

Svenson, H. K.

Callitriche stagnalis in eastern United States. *Rhodora* **34**: 37–38. February, 1932.

Monographic studies on the genus Eleocharis. II. *Rhodora* **34**: 193–203; 215–227. 3 pl. October and November. Published also as *Brooklyn Botanic Garden Contributions* No. 65.

APPENDIX 3

TALKS, LECTURES, ADDRESSES, AND PAPERS GIVEN BY MEMBERS OF STAFF DURING 1932

By the Director:

January 14. *The greatest scientific discovery.* Phi Kappa Phi, Syracuse University Chapter, Semi-Annual Meeting. Syracuse.

January 14. *Remarks on university botanical education.* Biological Group, Syracuse University.

April 5. *The Brooklyn Botanic Garden and the City.* Colonial Daughters of the 17th Century. At the Garden.

April 9. *Trees and civilization.* (At the planting of a tree to the memory of Mrs. James Robert McKee.) New York

Bird and Tree Club. American Museum of Natural History, Manhattan.

April 13. *Gardens within a garden.* Women's City Club, Manhattan.

April 18. *Progress of development of the Brooklyn Botanic Garden.* Garden Teachers Association of Brooklyn Botanic Garden. At the Garden.

April 26. *The meaning of the Botanic Garden for Brooklyn.* Woman's Auxiliary of the Garden. Home of Mrs. E. C. Blum, Brooklyn.

May 5. *Aims and activities of the Brooklyn Botanic Garden.* Civitas Club. At the Garden.

May 17. *The civic importance of the Brooklyn Botanic Garden.* Kiwanis Club. Towers Hotel.

May 19. *Activities of the Brooklyn Botanic Garden.* Woman's League, Reformed Protestant Dutch Church, Flatbush.

June 1. *What the Botanic Garden means to Brooklyn and Greater New York.* The Flatbush 12:45 Luncheon Club, Inc.

November 10. *Tribute to Dr. George F. Kunz.* American Museum of Natural History. [On the occasion of the planting of a memorial oak to Dr. Kunz in front of the Roosevelt Memorial.]

November 18. *The foundational literature of botany.* New York Association of Biology Teachers and Torrey Botanical Club. Joint meeting at Brooklyn Botanic Garden.

By the Curator of Public Instruction:

January 11. *The conservation of our native plants.* P. S. 92, Parent-Teachers' Association. Brooklyn.

January 14. *Forestry.* P. S. 109, Queens.

January 21. *Our native shrubs.* Flushing Garden Club.

February 23. *Native medicinal plants.* St. Johns College of Pharmacy.

April 21. *How plants get their food.* Biology students of Brooklyn High Schools. At the Garden.

April 28. *Forestry.* Biology students of Brooklyn High Schools. At the Garden.

By the Curator of Elementary Instruction:

January 5. *Window boxes and indoor gardening.* City Gardens Club.

January 8. *Plant propagation.* Brooklyn Botanic Garden Publicity Meeting, Plandome, Long Island.

January 30. *Educational work of the Brooklyn Botanic Garden.* Heads of Department Association.

February 2. *Graduation address.* P. S. 142.

February 2. *Indoor gardening.* Kosmos Club. At the Garden.

February 16. *Nature study.* Upper assembly, P. S. 6.

February 16. *Germination.* Lower assembly, P. S. 6.

February 27. *Stories of nature.* Reunion of Waubanakee Campers.

March 1. *Roots and what they do.* P. S. 6.

March 10. *Nature study at the Brooklyn Botanic Garden.* New York City Branch, American Nature Study Society. At the Garden.

March 15. *How to plant seeds indoors.* P. S. 6.

April 6. *Nature study.* P. S. 232.

April 8. *Nature study.* Upper assembly, P. S. 202.

April 8. *Nature study.* Lower assembly, P. S. 202.

April 11. *Home nature study for children.* Parent-Teacher Association, Bradford School, Montclair, N. J.

April 12. *The beginner's garden.* Department of Education, Brooklyn Institute of Arts and Sciences.

April 13. *Children's work at the Brooklyn Botanic Garden.* Fort Greene Chapter, D. A. R. At the Garden.

April 14. *Arbor Day.* Eastern District High School.

April 14. *The Brooklyn Botanic Garden.* Mothers' Club, Maxwell Practice School. At the Garden.

April 15. *Children's gardens.* Brooklyn Botanic Garden Publicity Meeting, Flushing, Long Island.

April 25. *Gardening for children.* Watchung School, Upper Montclair, N. J.

April 26. *House plants for our classroom: how to care for them.* P. S. 6.

April 28. *Plant propagation.* Westhampton Garden Club. At the Garden.

April 29. *Arbor Day.* P. S. 194.
May 3. *Gardening.* Study Club, New Paltz, N. Y.
May 5. *The work of the Brooklyn Botanic Garden.* Woman's Benevolent League, Marcy Avenue Baptist Church. At the Garden.
May 7. *The Brooklyn Botanic Garden.* General Lord Stirling Society, C. A. R. At the Garden.
May 9. *Gardens as a creative influence in children's lives.* Parent-Teacher Association, P. S. 101, Queens.
May 12. *Gardening for children.* Children's Department, Brooklyn Public Library. At the Garden.
May 17. *Children's gardening.* Mothers' Club, P. S. 225. At the Garden.
May 18. *The Brooklyn Botanic Garden.* Mothers' Club, P. S. 235. At the Garden.
May 19. *Dish gardening.* Brooklyn Section, Public School Kindergarten Association. At the Garden.
May 23. *Gardens for children.* Brooklyn Plant, Flower and Fruit Guild.
May 31. *Plants and what they mean.* P. S. 6.
June 3. *Gardens for children.* Long Island Federation of Women's Clubs, Garden City.
June 8. *The Brooklyn Botanic Garden.* People's Institute. At the Garden.
June 8. *The Brooklyn Botanic Garden.* The Retail Meat Dealers of New York State. At the Garden.
June 28. *Nature work at the Brooklyn Botanic Garden.* National Education Association, Atlantic City.
June 29. *The children's garden at the Brooklyn Botanic Garden.* School Garden Association, Atlantic City.
September 21. *Plant life.* Lily of the Valley Guild.
September 22. *What the Brooklyn Botanic Garden offers to teachers.* Brooklyn Teachers Conference. At the Garden.
September 24. *The children's garden.* Parents of Brooklyn Botanic Garden Boys and Girls Club. At the Garden.
September 26. *The work of the Brooklyn Botanic Garden.* Friends and Parents of "Young Defenders." At the Garden.

October 1. *Children's educational work at the Brooklyn Botanic Garden.* Class from New York University. At the Garden.

October 3. *Fall nature study.* Conference of Ungraded Teachers of New York City.

October 5. *House plants.* Mothers' Club, P. S. 186.

October 14. *The Brooklyn Botanic Garden: its beautiful features.* Family Service Department, Brooklyn Bureau of Charities. At the Garden.

October 24. *Indoor culture of bulbs.* Garden Club of Freeport.

November 18. *Thanksgiving fruits.* Upper assembly, P. S. 91, Manhattan.

November 18. *Thanksgiving fruits.* Lower assembly, P. S. 91, Manhattan.

November 30. *Plants and their work.* P. S. 155, Queens.

December 3. *Educational work at the Brooklyn Botanic Garden.* Tufts College Alumnae Association.

December 6. *Nature education at the Brooklyn Botanic Garden.* Parents' Association, Adelphi Academy.

December 12. *Nature study in education.* Parent-Teacher Association, Berkeley Institute.

December 14. *Evergreens.* P. S. 155, Queens.

December 19. *Nature study in education.* Brooklyn Botanic Garden Auxiliary: Publicity Meeting. At the Garden.

December 21. *Christmas greens.* P. S. 235.

December 27. *The Brooklyn Botanic Garden's service in nature education.* American Nature Study Society, Atlantic City, N. J.

By the Curator of Plant Pathology:

January 2. *Gardens of Japan.* Salem Garden Club, Salem, Mass.

January 18. *Iris of Japan.* New Haven Garden Club, New Haven, Conn.

March 4. *Iris.* Woodman Choral Club, Brooklyn, N. Y. At the Garden.

April 4. *Iris of Japan.* Bronxville Women's Club, Inc. Bronxville, N. Y.

April 5. *Iris of Japan.* Woman's Club of Hillside, N. J.
April 13. *Gardens of Japan.* Horticultural Society of Staten Island, St. George, Staten Island, N. Y.
May 4. *An iris pilgrimage to Japan.* The Garden Club of Greater New Bedford, Mass.
May 23. *Iris of Japan.* Huntington Nature Club. At the Garden.
June 7. *Iris.* Garden Lovers Club, Elizabeth, N. J.
June 29. *Iris of Japan.* Flushing Garden Club. At the Garden.
July 25. *Iris.* Riverside Garden Club, Riverside, Conn.
August 5. *Inheritance of disease resistance in plants.* New York University Camp, Sloatsburg, N. Y.
August 12. *Iris.* The Garden Club of Old Greenwich, Conn.
August 27. *Inheritance of resistance to loose and covered smuts in hybrids between certain susceptible oat varieties and Black Mesdag.* Sixth International Congress of Genetics, Ithaca, N. Y.
October 28. *Illustrations of plant breeding.* Biology Class of Thomas Jefferson High School. At the Garden.

By the Curator of Plants:

March 16. *Flower buds and the classification of dicotyledons.* Torrey Botanical Club. At the New York Botanical Garden.

By the Assistant Curator of Plants:

January 9. *Native Plants.* Torrey Botanical Club. At the Garden.
February 12. *The Galapagos and Cocos Islands.* Society of the Sigma Xi, Union College, Schenectady, N. Y.
April 12. *The Galapagos and Cocos Islands.* Kiwanis Club. Brooklyn, N. Y.
October 27. *The Local Flora Section of the Brooklyn Botanic Garden.* National Plant, Flower and Fruit Guild. New York City.

By the Horticulturist:

March 15. *Principles of spring rose pruning.* American Rose Society. Broadcast over Station WJZ.
March 28. *Care of ornamental shrubs.* Flushing Garden Club.
March 31. *Perennials and roses.** State Street School, Hackensack, New Jersey.
April 1. *Rock gardens.** State Street School, Hackensack, New Jersey.
April 7. *Perennials.** Columbia Senior High School, Maplewood, New Jersey.
April 11. *Annuals.** Columbia Senior High School, Maplewood, New Jersey.
April 13. *Perennials and rock garden plants.** Morristown, New Jersey.
April 23. *Brooklyn Botanic Garden.* Women's League of the Classon Avenue Presbyterian Church, Brooklyn.
April 26. *Roses and shrubs.** Passaic County, New Jersey.
April 27. *Annuals and perennials.** Paterson, New Jersey.
April 27. *Worthwhile rock plants.*† Broadcast over Station WOR.
May 4. *Summer ground covers.*† Broadcast over Station WOR.
May 6. *Annuals.** Cape May Court-House, New Jersey.
May 6. *Growing better perennials.** Cape May Court-House, New Jersey.
June 1. *Waterlilies.*† Broadcast over Station WOR.
July 18. *Unusual perennials for 1933.*† Broadcast over Station WOR.
August 8. *Mid-summer care in the rock garden.*† Broadcast over Station WOR.
September 15. *Care of the perennial garden in late summer and early fall.*† Broadcast over Station WOR.

* Addresses marked with an asterisk were given in co-operation with the Garden Institute in connection with Co-operative Extension Work in Agriculture and Home Economics of the State of New Jersey.

† Radio Garden Club addresses given in connection with Co-operative Extension Work in Agriculture and Home Economics of the State of New Jersey.

September 30. *Planting bulbs for spring bloom.*† Broadcast over Station WOR.

October 3. *Roses.* Woman's City Club. At Brooklyn Botanic Garden.

October 6. *The Rose Garden in fall and winter.* Fall Rose Garden Day. At the Garden.

October 10. *Pruning.* Laurence Garden Club.

October 19. *Indoor plant culture.* Before New York City teachers. American Museum of Natural History.

November 17. *A winter garden with house plants.*† Broadcast over Station WOR.

November 29. *Artistry in gardens.* Rockville Center Art Club.

December 1. *The Wardian case as an aid in growing house plants.*† Broadcast over Station WOR.

By the Resident Investigator (Ferns):

January 9. *Fern growing.* New York Botanical Garden.

February 15. *Ferns, indoor and out. House plants.* Mt. Vernon Garden Club.

May 12. *Eugenics: A biologist looks into the future.* American Museum of Natural History.

May 19. *Plant breeding, new and old.* Brooklyn Botanic Garden.

May 26. *The growth of the idea of evolution.* Brooklyn Botanic Garden.

June 27. *The cultural value of biology in secondary education.* Department of Science Instruction, National Education Association, Atlantic City, New Jersey.

By the Resident Investigator (Economic Plants):

May 12. *Beverage Plants.* To biology students of Brooklyn High Schools. Brooklyn Botanic Garden.

By Instructors:

Miss Dorward:

June 28. *The Brooklyn Botanic Garden.* Mothers' Club, P. S. 135. At the Garden.

Miss Jenkins:

May 17. *The Brooklyn Botanic Garden.* Mothers' Club, P. S. 134. At the Garden.

September 26. *The Japanese Garden.* Queens Village Garden Club. At the Garden.

September 28. *The Japanese Garden.* Great Neck Garden Club. At the Garden.

October 19. *Activities of the Brooklyn Botanic Garden.* Mothers' Club, P. S. 130. At the Garden.

November 16. *My work at the Brooklyn Botanic Garden.* Alumnae Association, Mount Holyoke Club of New York.

Miss Miner:

March 7. *Children's gardening at the Brooklyn Botanic Garden.* Woman's Guild for Service, Central Congregational Church.

April 29. *Arbor Day.* P. S. 142.

September 22. *Fiber plants.* Class from Brooklyn College. At the Garden.

September 30. *The Japanese Garden.* Manhasset Garden Club. At the Garden.

December 27. *The Brooklyn Botanic Garden's service in nature education.* American Nature Study Society, Atlantic City, N. J.

Miss Rusk:

April 14. *Reproduction in the flowering plants.* Biology students of Brooklyn high schools. Brooklyn Botanic Garden.

By the Registrar and Custodian:

April 26. *Glimpses of nature.* Conestogan Club. Colony House, Brooklyn.

May 26. *Life cycle of the honeybee.* Brooklyn Nature Club. Brooklyn Botanic Garden.

APPENDIX 4

REPORT ON BROOKLYN BOTANIC GARDEN PUBLICATIONS, 1932

American Journal of Botany

Official Organ of the Botanical Society of America Volume XIX (1932) comprised, as usual, ten monthly issues (omitting August and September), with 63 papers, 865 pages, 57 plates, and 387 text figures (as against 68 papers, 887 pages, 64 plates, and 280 text figures in 1931). Three papers were published on the "author payment" plan. Dr. Arthur Harmount Graves continued on the editorial board as representative of the Brooklyn Botanic Garden. At the annual meeting of the Botanical Society of America in Atlantic City, the last week in December, Prof. Sam F. Trelease, of Columbia University, was elected Editor-in-Chief, in place of Prof. Edmund W. Sinnott, who resigned after six years of service.

The circulation at the close of the fiscal year (November 30, 1932) was 1697 as against 1704 one year ago. The annual budget was $14,523.64 against $15,660.40 in 1931. The year closed with a credit balance of $2,744.35 and assets over liabilities of $2,855.11 plus the value of back sets and volumes on hand.

Ecology

Official Organ of the Ecological Society of America

Quarterly. Volume XIII comprised 35 papers (besides reviews, proceedings, and miscellaneous matter), 424 pages and 109 text figures (as against 43 papers, 744 pages, and 258 text figures in 1931). The circulation at the close of the fiscal year (November 30, 1932) was 1160 as against 1140 one year ago.

The annual budget was $5286.64, the credit balance $1727.37 and assets over liabilities $1156.71 (against $5634.31, $399.55 and $343.18 liabilities over assets in 1931) plus back sets and volumes on hand. Dr. Henry K. Svenson succeeded Dr. Alfred Gundersen on the editorial board as the Brooklyn Botanic Garden representative. Prof. Alfred E. Emerson and Prof. George D. Fuller, both of the University of Chicago, continued as Editor and Associate Editor, respectively.

Genetics

In Co-operation with the Editorial Board of Genetics

Bimonthly. Volume XVII comprised 34 papers, 711 pages, 13 plates, and 97 text figures (as against 33 papers, 680 pages, 12 plates, and 112 text figures in 1931). In *Recent Advances in Plant Genetics* by Sansome and Philp (Blakiston, 1932) there are 47 pages of bibliography of genetics papers. In this list there are 118 citations of papers that have been published in Genetics. The number of citations for five other leading genetics journals of the world are as follows: 101, 78, 61, 53, 13. At the close of the fiscal year (November 30, 1932) the circulation was 657, the annual budget $5822.13, the credit balance $938.01, and assets over liabilities $1369.34 (as against 685, $5474.44, $719.24, and $1161.59 in 1931). Dr. Donald F. Jones, Connecticut Agricultural Experiment Station, continued as Managing Editor.

Brooklyn Botanic Garden Record

Bimonthly. Volume XXI (1932) comprised 330 pages. As usual, the March number comprised the Annual Report. The May number constituted Guide No. 7, The Story of Our Boulders, Glacial Geology of the Brooklyn Botanic Garden, and the July number was Guide No. 8, The Story of Fossil Plants, Guide to the Transparencies in Conservatory House No. 2. The circulation of the Record at the close of the year was 1726.

Leaflets

Six single numbers were issued. The circulation as of December was 1942 copies. Dr. Arthur Harmount Graves, curator of public instruction, is the editor.

Contributions and Memoirs

Numbers 62, 63, 64, and 65 of the Contributions were published.

APPENDIX 5

FIELD TRIPS CONDUCTED

By the Curator of Public Instruction:

February 28. Torrey Botanical Club. Bear Mountain and Anthony's Nose.
December 11. Torrey Botanical Club. Flushing to Queens Village. (Mr. Charles F. Doney substituting.)

By the Curator of Plants:

May 7. Brooklyn Institute of Arts and Sciences, Department of Botany. To Hollis, L. I. Flowering plants compared with flowerless plants.
June 4. Torrey Botanical Club at the Brooklyn Botanic Garden.

By the Assistant Curator of Plants:

March 20. Torrey Botanical Club. To Blauvelt, N. Y.
October 22. Torrey Botanical Club. To Coytesville, N. J.
December 29. Botanical Society of America, Systematic Section. To the pine barrens near Atlantic City. (H. K. Svenson and others.)

By the Registrar and Custodian:

October 8. Department of Botany, Brooklyn Institute. To Tarrytown, New York.

APPENDIX 6

MEETINGS OF ORGANIZATIONS AT THE GARDEN 1932

January 9. Torrey Botanical Club
January 28. Woman's Auxiliary
February 2. Woman's Auxiliary and Kosmos Club
February 19. Woman's Auxiliary and Brooklyn Woman's Club
February 24. Long Island Federated Executives
March 4. Woodman Choral Club
March 10. American Nature Study Society
March 28. Monday Culture Charity Club

March 28. Girl Scout Dish Garden Exhibit
April 5. American Daughters of the 17th Century, D. A. R.
April 12. Woman's Auxiliary, Brooklyn Botanic Garden
April 13. Fort Greene Chapter, D. A. R.
April 14. Mothers Club, Maxwell Practice
April 18. Garden Teachers Association, Brooklyn Botanic Garden
April 20. Illuminati Club
April 23. Torrey Botanical Club
April 27. Nathan Hale Club
April 28. Westhampton Beach Garden Club
May 2. Brooklyn Woman's Club
May 4. National Society of D. A. R., Women of '76
May 5. Woman's Benevolent Society, Marcy Avenue Baptist Church
May 5. Luncheon by Mrs. William H. Cary
May 5. Civitas Club
May 7. Children of the American Revolution
May 11. Hackettstown, New Jersey, Garden Club
May 12. Children's Department, Brooklyn Public Library
May 13. New York Bird and Tree Club
May 13. Long Island Federation of Executives of Garden Clubs
May 16. Glen Ridge, New Jersey, Garden Club
May 17. Urban Club
May 17. Mothers Club, P. S. 225
May 17. Mothers Club, P. S. 134
May 18. Mothers Club, P. S. 235
May 19. Brooklyn Kindergarten Teachers Association
May 23. Contemporary Club
May 23. Huntington, L. I., Nature Club
May 26. Brooklyn Nature Club
June 4. Torrey Botanical Club
June 8. Peoples Institute
June 9. Dingmans Ferry, Pa., Garden Club
June 9. Minisink Garden Club, Sussex County, New Jersey
June 14. Brooklyn College faculty reception to Senior Class
June 15. Department of Botany, Brooklyn Institute
June 17. Italian Club, Brooklyn College
June 18. Camp Happi-Wak

June 18. Vagabond Club of Jersey City Y. M. C. A.
June 30. Flushing Garden Club
September 8. Cedarhurst Garden Study Club
September 26. Queens Village Garden Club
September 29. Great Neck Garden Club
September 30. Manhassett Garden Club
October 3. Women's City Club of New York
October 14. Brooklyn Bureau of Charities, Home Service Department
October 18. Department of Botany. Brooklyn Institute
October 19. Mothers Club, P. S. 130
October 29. Daughters of the American Revolution
November 18. Torrey Botanical Club
November 18. New York Association of Biology Teachers
December 19. Brooklyn Botanic Garden Woman's Auxiliary publicity meeting

	1931	*1932*
Number of organizations	23	59
Total attendance	1,146	2,741

APPENDIX 7

REPORT ON PHOTOGRAPHIC WORK

Negatives on file December 31, 1931		7,310
Negatives accessioned during 1932		1,090
Total negatives on file December 31, 1932		8,400
Lantern slides on file December 31, 1931		5,730
Lantern slides accessioned during 1932		375
Total lantern slides on file December 31, 1932		6,105
Prints on file December 31, 1931		3,686
Prints made during 1932	7,934	
Used or distributed	5,944	
Prints filed during 1932		1,090
Total prints on file December 31, 1932		4,776
Enlargements made		28

Respectfully submitted,

FRANK STOLL,
Registrar.

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Lewisohn, Adolph
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Membership.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, N. Y.* Telephone, Prospect 9-6173.

The Botanic Garden is open free to the public daily from 8 a.m. until dusk; on Sundays and Holidays it is open at 10 a.m.

Entrances.—On Flatbush Avenue, near Empire Boulevard and near Mt. Prospect Reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Crown Street.

To Assist Members and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one day in advance. No parties of less than six adults will be conducted.

To Reach the Garden take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, or Tompkins Avenue trolleys to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street or Vanderbilt Avenue trolleys to Prospect Park Plaza and Union Street. By Automobile from points on Long Island take Eastern Parkway west and turn left at Washington Avenue; from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway, turn left following Parkway to Washington Avenue; then turn right.

BROOKLYN BOTANIC GARDEN
PUBLICATIONS

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly (1929–1932); quarterly (1933–). Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, announcements of courses of instruction, seed list, guides, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others $1.00 a year. Circulates in 59 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Circulates in 47 countries.

Volume I. *Dedication Papers:* comprising 33 scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. 521 pages. Price $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. Price $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor, June 10, 1927. 151 pages. Price $1.60.

CONTRIBUTIONS. Established, April 1, 1911. Papers originally published in periodicals, reissued as "separates," without change of paging, and numbered consecutively. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume. Circulates in 34 countries.

63. Inheritance of resistance to loose and covered smut in a hybrid of Early Gothland and Victor oats. 10 pages. 1932.

64. Inheritance of resistance to loose and covered smut in hybrids of Hull-less with Early Gothland and Monarch oats. 28 pages. 1932.

65. Monographic studies in the genus Eleocharis—II. 34 pages. 1932.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries.

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SEED LIST. (*Delectus Seminum*) Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 160 botanic gardens and institutions located in 40 countries.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in coöperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription, $7.00 a year. Circulates in 53 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $4.00 a year. Circulates in 48 countries.

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VOL. XXII JULY, 1933 No. 3

CONTENTS

PAGE

Exhibition of Plant Forms in Ornament 167

Little-Used Sources of Plant Forms for Design 168

Plant Forms in Design 172

Notes on an "American Order" of Architecture 177

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FIG. 12. Corn and wheat capital, Litchfield Mansion, Prospect Park, Brooklyn. Designed 1855 by Alexander J. Davis (cf. Fig. 15). Photograph by Louis Buhle (8486).

BROOKLYN BOTANIC GARDEN RECORD

VOL. XXII JULY, 1933 NO. 3

EXHIBITION OF PLANT FORMS IN ORNAMENT

An exhibition illustrating the use of plant forms in ornament was opened on May 8, 1933, at the Metropolitan Museum of Art, the New York Botanical Garden, the New York Public Library, and the Brooklyn Botanic Garden cooperating. The exhibition will be open until September 10.

The objects of art are from the collections of the Metropolitan Museum, and living plants of the kind from which the designs were derived are placed near the corresponding objects. The plants are supplied by the New York Botanical Garden and the Brooklyn Botanic Garden.

The New York Public Library has compiled a list of books of related interest to be found in the various libraries of New York City. The list is published in the *Bulletin*[1] of The New York Public Library, beginning in June, classified so as to provide a background for the museum display and also a practical working list for students of ornament. The list is classified under six main headings: plant forms as motives and patterns; plant forms in the applied arts; plant forms in the fine arts; plant forms in symbolism; plant forms as source material.

During June, there was held in the American Museum of Natural History an exhibit of patterns and motives of ornament derived from plants by students of three New York City High Schools—Girls Commercial High School, Brooklyn, and Textile High School and Washington Irving High School, Manhattan—and seven schools of design—Cooper Union Woman's Art School, Grand Central School of Art, New York School of Applied De-

[1] Bulletin of the New York Public Library, **37**: June, July, and August, 1933.

sign for Women, New York School of Design, New York School of Fine and Applied Art, Newark School of Fine and Industrial Art, and Pratt Institute School of Fine and Applied Arts.

The fish in the pool of aquatic plants, which is the central object of the exhibit at the Museum, were supplied by the New York Aquarium. Thus six New York institutions have cooperated in the project, which has aroused widespread interest in educational and art circles.

The two articles immediately following in this issue of the RECORD were published in the June and July issues of the *Bulletin* of the Metropolitan Museum, and the permission of the Museum to reprint them here is gratefully acknowledged.

LITTLE-USED SOURCES OF PLANT FORMS FOR DESIGN [1]

From the time that man commenced to make pottery and to work in stone, plant forms have been used as a basis of design. Indeed some of the bas-reliefs on ancient stone structures and the designs on early pottery, or even the shapes which became the models for earthen vessels, form important sources of information for us in reference to the plants economically important to ancient man both in Eurasia and in America. In the distant past, as at present, some of the designs are so conventionalized that the actual origin of the idea is obscure, but in many cases it is perfectly obvious, whether plants, leaves, flowers, or fruits.

Those who utilize plant forms in design are familiar with the uses and limitations of such works as Plauszewski's Graines et plantes sèches, Nierendorf's Urformen der Kunst: photographische Pflanzenbilder von Professor Karl Blossfeldt, and Hatton's Craftsman's Plant Book, or Figures of Plants. The object of this brief paper is not to discuss the published sources generally known to artists and designers, but rather to point out some original sources which are accessible yet relatively little used.

Everyone realizes that there is a wealth of material available in nature, but those who go to nature for their models or for their

[1] Reprinted with permission from the *Bulletin* of the Metropolitan Museum of Art, **28**: 102–104. June, 1933.

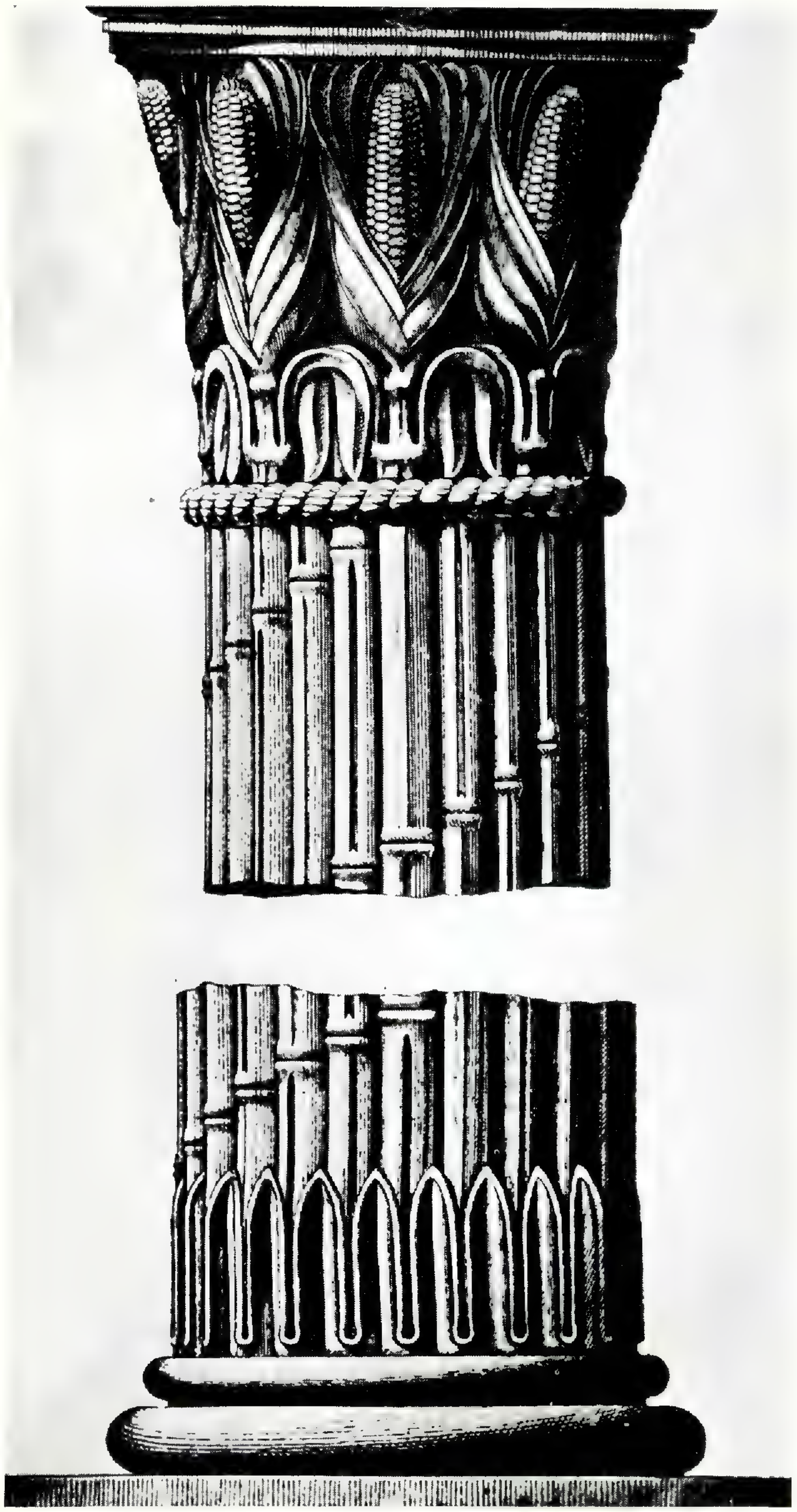

FIG. 13. Corn capital, United States Capitol, Washington. Designed in 1809 by Benjamin Henry Latrobe. (After Latrobe's drawing. Reproduced from History of the United States Capitol, by Glenn Brown.)

ideas also know that in nature desirable forms are often widely scattered; and for the city dweller it is no small task to locate in the country material that he or she may desire. Many plants, moreover, are seasonal, while others are very restricted in their range and occurrence.

Few realize that there is assembled and available, in living form and as reference material, a great wealth of plant specimens within the limits of the City of New York, at the New York Botanical Garden in the Bronx and at the Brooklyn Botanic Garden. In both institutions distinct advantages are presented in the assembling, within limited areas, of great collections of plant species, so that one may find not only local plants but also exotics from all over the world.

Attention is especially directed not so much to the plants growing out of doors as to the largely tropical, often bizarre plants cultivated in the garden conservatories; ferns and cycads, bananas and palms, orchids and bromeliads, showy flowering shrubs and attractive annuals, aquatic plants, cacti in multitudinous forms from the drier parts of North and South America, strange succulents from South Africa, and remarkable aroids from the tropics of both hemispheres. Nowhere in nature will one find assembled in such a compact area so many diverse forms as in these two botanical gardens.

There is still another source that remains practically untouched, and that is the extensive collections of mounted specimens in the herbaria of these two institutions. In the herbarium of the New York Botanical Garden there are approximately two million specimens, and in the Brooklyn Botanic Garden important collections of a similar kind. While much of this material does not lend itself to the purpose under discussion, yet in special groups, such as the tropical ferns, many strange and attractive forms are represented.

A few weeks ago an artist was looking up illustrations of oaks in our library. It developed that she had been commissioned to prepare a design for a dining-room ceiling, based on oak leaves and acorns representing species characteristic of the two hemispheres. The suggestion was made that she examine not the published illustrations alone but the herbarium material also. This idea proved to be of real service, because she thus had the choice

of several hundred species in convenient form, many of which have never been illustrated.

In the microscopic forms of plant life such as the diatoms and desmids and other minute algae, in pollen grains, and in the anatomical structure of plant parts there are numerous other sources of design that have scarcely been utilized. One does not need to be a microscopist, however, to take advantage of this material, for here the adaptations can be made from the multitudinous published illustrations. The macroscopic and microscopic fungi and the mosses, liverworts, and lichens present additional possibilities, as do buds and bud scales, leaf scars, the unfolding of young leaves, fruits, seeds, and even the structure of plant hairs in the higher plants.

At both of the gardens, as well as at the Horticultural Society of New York, reference libraries are maintained, the contents of which are available to those who desire access to them.[2] Being specialized, these libraries naturally contain a great many works that are not to be found in other libraries in the city. The library of the New York Botanical Garden is particularly rich in sets of periodicals, in the older illustrated books appertaining to plants, including herbals, and in the sumptuously illustrated folios, such as complete sets of publications with plates by Redouté, Jacquin, Roxburgh, Willmott, Millais, Elwes, Berlèse, and Sibthorp.

It is hoped that these suggestions may be of service to that large public interested in art, especially to those who wish to study plant forms as a basis of design. The resources of the two gardens are available to all who by training and experience are equipped to take advantage of what they have to offer. Both institutions are open every day during the year, including holidays and Sundays, and special permits are freely granted to artists who wish to sketch in the grounds and in the conservatories.

E. D. Merrill.

New York Botanical Garden.

[2] The library of the New York Botanical Garden contains about 43,000 bound volumes, including over 600 illustrated folios; the Brooklyn Botanic Garden library, about 18,000 bound volumes, including a special library of more than 300 volumes of pre-Linnaean works and incunabula, rich in early examples of botanical illustration and the use of plants as a source of design for title-pages, tail-pieces, rubrics, fleurons, and tooling on bindings. The library of the Horticultural Society of New York has about 3000 volumes.

PLANT FORMS IN DESIGN [1]

It is probable that the western rose window of the Cathedral of Chartres embodies the largest design based upon a plant form ever produced, its diameter over all being nearly forty-four feet. To a modern American this ought surely to be an interesting fact, for is it not an American trait to determine value by size? It is outside the scope of this brief article to show why the marvelous beauty of this rose window is not due to its size, or indeed how it challenged the utmost skill of the architect to keep the window beautiful while making it large enough to illuminate the unusually lofty vault of the cathedral.

It may seem naïve indeed for a mere botanist to make the flat statement in the bulletin of an art museum that the rose window of a cathedral, as its name implies, derives its form from the flower. But though all artists know this,[2] many laymen do not, so greatly does the design depart from the rose motive in some instances. In the cathedrals of the twelfth century, for example, as at Beauvais, rose windows were sometimes treated quite definitely as wheels.

This leads us to a fundamental principle—that imitation is not art. "The more closely nature is copied," said Owen Jones, "the farther we are removed from producing a work of art." [3] In his Proposition 13 he stated that "Flowers or other natural objects should not be used as ornaments, but conventional representations founded upon them, sufficiently suggestive to convey the intended image to the mind, without destroying the unity of the object they are employed to decorate." [4] And then he added, in italics: "Universally obeyed in the best periods of Art, equally violated when Art declines."

Possibly we find in Proposition 13 one reason why the Indian-corn column and capital which Latrobe designed for the lower vestibule of the Senate wing of the Capitol at Washington were never generally accepted by architects. So far as the writer

[1] Reprinted, slightly altered, with permission, from the *Bulletin* of the Metropolitan Museum of Art, **28**: 126–127. July, 1933.

[2] Some historians of art, to be sure, deny that the design of the so-called "rose" windows was derived from the rose.

[3] The Grammar of Ornament, p. 154.

[4] Op. cit., p. 6.

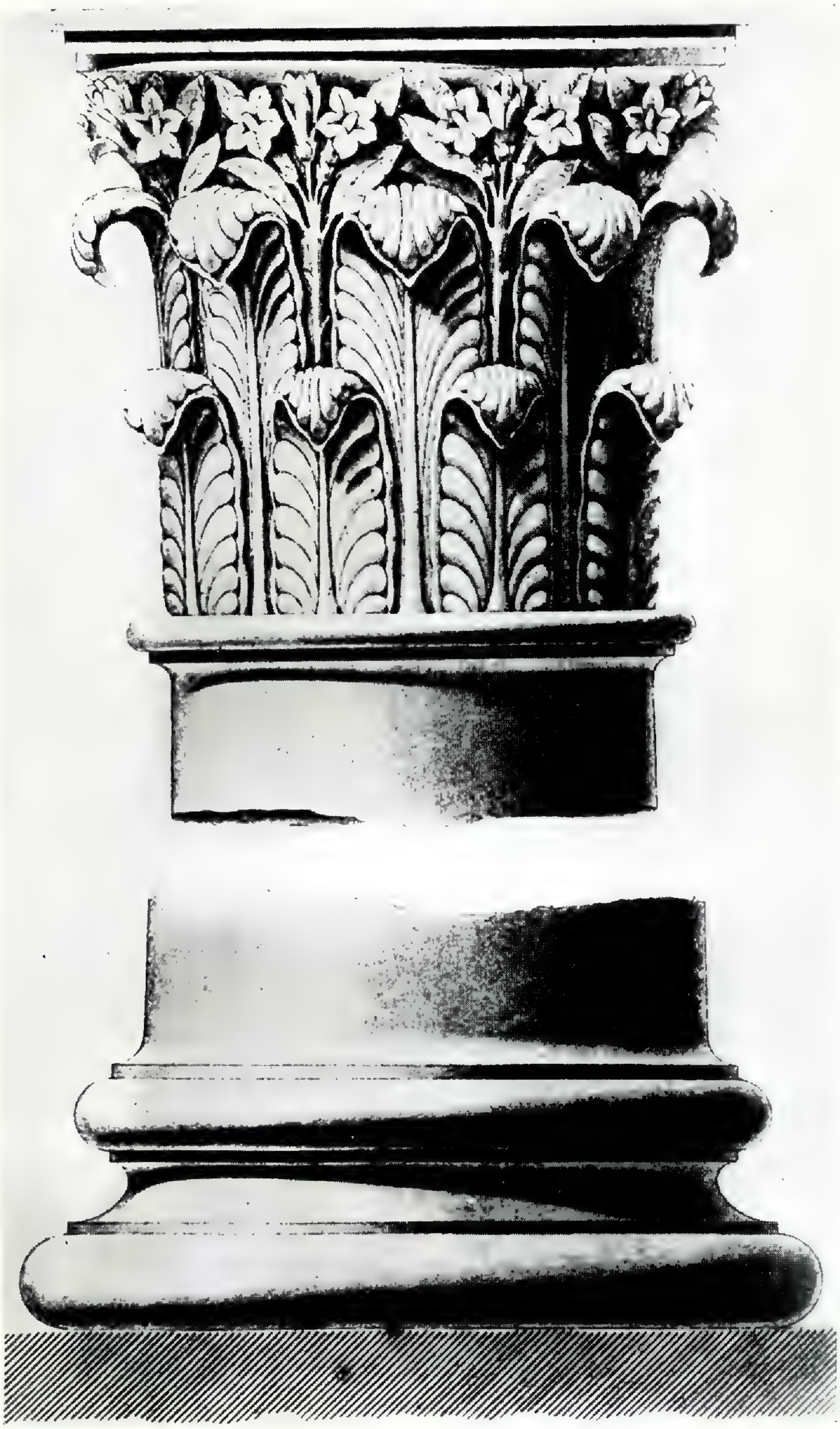

FIG. 14. Tobacco capital, United States Capitol, Washington. Designed 1817 by Benjamin Henry Latrobe. (After Latrobe's drawing. Reproduced from History of the United States Capitol, by Glenn Brown.)

knows, there are only two other examples of Indian-corn capitals: those on the columns of the Playmakers' Building, University of North Carolina, Chapel Hill, dating from 1850, and those on the porch columns of the Litchfield Mansion, Prospect Park, Brooklyn, built about 1854. There are fourteen of the latter, hand carved in wood.[5]

We are told that the ancient Egyptians tied their native plants to the wooden columns or posts of their primitive temples, and that these forms were transformed to stone as their civilization advanced and their art assumed a more permanent character. And yet here, as in the rose windows of Christian cathedrals, there was no slavish copying of nature—no attempt at faithful reproduction. If a dozen Egyptian capitals were chosen at random, we might find no two alike; and yet, in each case, the design would be derived from the lotus or the papyrus. We find the acanthus used in a similar fashion by the Greeks, but with an endless number of variations and modifications.

Apparently the "corn cob capital" did not appeal to American achitects as having possibilities in design, as did the papyrus and lotus to the Egyptians or the acanthus leaf to the Greeks. Why, we must leave it to the architects to answer. Possibly if the Indian corn (*Zea Mays*) had had a deep religious significance for us, as the lotus did for the Egyptians, we might have had a distinctive, and possibly very effective, American order of architecture. Being eclectic in our religion, which was derived from the Jews, we also become eclectic in our architecture and drew on the Greeks.

Plant forms in design range in size all the way from the great rose window of Chartres to Persian miniatures executed on so small a scale that a reading glass is needed to detect the beauty of their fine detail. And herein is a suggestion for a new source of design from the plant world—one which artists have scarcely tapped as yet, in fact, one of which many may be wholly ignorant. I refer to the very fine details of the structure of plant tissues and living substance (protoplasm) revealed only by the higher magnifying powers of the compound microscope.

The material consists of the cross sections of roots and stems which show the cellular structure and, under a still higher mag-

[5] See Notes on an "American Order" of architecture, p. 177 of this issue of the Brooklyn Botanic Garden Record.

nification, the details of the cells themselves, especially during the marvelously delicate changes of nuclear and cell division. The endless forms and combinations to be observed in this material would be specially appropriate for textile designs. They are so unlike anything ever seen by the naked eye or anything geometrical that the chances are infinitesimal that they could ever be evolved by pure imagination.

In preparing sections of tissue for botanical study a microtome, or precision section cutter, is used. The slices are so thin that they are almost transparent and are therefore not easily seen without being stained. Different portions of the tissue or cell have affinities for stains of different color, three different colors being commonly used for one preparation. The result is, therefore, an object which suggests a pattern for color as well as for design.

Again, the surfaces of plant parts are frequently of rare beauty when seen under the lower powers of the microscope. The velvety petals of flowers, the epidermal growths on leaves and young stems, and the cellular details of the epidermis, or skin, of leaves may be cited as examples.

In a preceding article Dr. Merrill has called attention to whole organisms of microscopic dimensions, such as the desmids, diatoms, and algae and many fungi and their parts, all of great beauty and quite unlike the forms and patterns presented by the higher plants to the unaided vision. Here, in fact, is a whole new world which artists have hardly begun to explore—a Pandora's box of riches for one seeking something quite novel in design.

Camera lucida drawings and photomicrographs of such objects may be found in the publications in the library of any college or botanic garden. But best of all would be to make the acquaintance of some laboratory worker who is studying such material or using it in class work, and thus to observe it at first hand.

In the joint exhibition of the Metropolitan Museum and the two botanic gardens none of this material is shown since, as stated above, such sources of design have rarely, if ever, been used by artists. The visitor who views this exhibition will, however, carry away at least one general impression, and that is of the great extent to which design is based upon plant life. And this impression

will be deepened if he pauses a moment to reflect as he goes about his daily rounds. One can hardly enter a room, or sit in a chair, or look at the table cloth as he eats, or put on a dress or a necktie, or observe a building or a railway coach, or read an advertisement, or use a coin or paper money, without consciously or unconsciously acknowledging his indebtedness to the plant world as a source of design in art.

The desire for ornament is substantially coexistent with the beginnings of civilization, and it is a cause for optimism that there seems to be an elemental human urge to make beautiful whatever is made. As plants present the most beautiful forms and combinations of lines and surfaces to be found in man's environment, what is more natural than to use them as the basis of design?

Mr. Forest Grant has recently [6] called attention to the fact that "the desire to create fresh patterns for use in the world's industrial art has been leading our designers away from the plant forms which have so consistently furnished inspiration to the artists of all nations"—for example, the lotus of the Egyptians, the acanthus of the Greek.

"The machine age," he says, "with its cog wheels, riveting machines, and purring motors, has furnished another sort of rhythm to those who are responsible for much of the art of today. Objects of steel and stone have been appearing in our textile design with the same regularity with which they have appeared in our paintings, and murals. To many this movement away from nature has meant a loss in beauty of design which is much deplored."

Perhaps it will not seem too elementary to emphasize again that plants do not furnish design directly. The object of the present exhibition is to illustrate how plants have been utilized as a source of design. From plants the artist may obtain ideas and ideals, for the plant world can hardly be surpassed for perfection of beauty. But the design itself must emanate from the brain of the artist; the plant world can only furnish the raw materials.

What is needed is that artists shall not only make themselves familiar with classic designs, but also from time to time go directly to nature, comparing the established designs with the natural forms from which they were derived and making fresh observations.

[6] Bull. Metropolitan Museum of Art **28:** 102. June, 1933.

Through the study of plant forms one not only obtains suggestions as to details, but also learns the underlying principles of beauty, and by the application of these principles, not by merely copying what his eyes see, he may hope to produce something fresh and new in art.

C. Stuart Gager

NOTES ON AN "AMERICAN ORDER" OF ARCHITECTURE

While the 1933 exhibition on Plant Forms in Design was being planned at the Metropolitan Museum of Art, the writer happened to observe that the capitals of the porch columns on the Litchfield Mansion, Prospect Park, Brooklyn (Fig. 12) derived their design from Indian corn (*Zea Mays*) and wheat (*Triticum vulgare*).[1] This recalled what was already known, namely, that there is a "corn capital" in the Senate wing of the Capitol building in Washington. This is illustrated in Brown's *History of the United States Capitol,*[2] and the illustration is reproduced in this issue of the Record as figure 13. This capital was designed in 1809 by the architect, Benjamin Henry Latrobe, who also later (1817) designed a "tobacco capital" (Fig. 14) which was executed in stone and may be seen in the north or Senate wing.

Latrobe also originated a capital with the design based upon the cotton plant. This was never executed, but Latrobe's drawings of it are on file in Washington. He proposed these designs as contributions to what he called an "American Order" of architecture. While cotton is not an American plant, it is, of course, an important American crop.

Shortly after the corn capitals of the Litchfield Mansion were noted, the writer learned that there were similar capitals on the Playmakers' Building, University of North Carolina, at Chapel Hill. Through the kind cooperation of Dr. W. C. Coker, professor of botany, and director of the arboretum at Chapel Hill,

[1] The drawing of this capital on the front cover page of this issue of the Record is by Miss Maud H. Purdy.

[2] Brown, Glenn. History of the United States Capitol. (U. S. 56th Congress. 1st Session. Senate Document No. 60.) Washington. Goverment Printing Office. 1900.

FIG. 15. Corn capitals on the Playmakers' Building, University of North Carolina, Chapel Hill. Designed about 1850 by Alexander J. Davis (cf. Fig. 12). (Courtesy, University of North Carolina.)

the writer was supplied with a photograph of the Playmakers' Building (Fig. 15) and certain historical data concerning it.

On comparing the North Carolina capitals with those in Brooklyn, they were seen to be practically identical, and it seemed certain that they must have been designed by the same man. Through Dr. Coker, it was learned that the architect of the North Carolina building was Alexander J. Davis, of New York City, whose work there was authorized by the University in 1850.[3]

For a time all efforts to ascertain who was the architect of the Litchfield Mansion or the designer of its capitals were fruitless. Finally, the writer turned to the fountain head of all information concerning Long Island history, Miss Emma Toedteberg, librarian of the Long Island Historical Society. Miss Toedteberg "happened" to know that Mr. Joseph B. Davis, son of Alexander J. Davis, was living in White Plains, New York. From him it was learned that Mr. Alexander J. Davis was the architect of the Litchfield Mansion, thus confirming our inference that the mansion and the Playmakers' Building were the work of the same man. The mansion was commenced in April, 1855. The drawings and much of the data connected with it form a part of the "Davis Collection" at the Metropolitan Museum of Art. Mr. Davis was the architect of several of the older state capitols, and did architectural work for prominent citizens in twenty-three states.

The only other capital of the "American Order" that has come to the attention of the writer is the tobacco capital at Monticello, the home of Thomas Jefferson. This design is similar to, but not identical with, the one of Latrobe mentioned above. Ceracci's bust of Jefferson, at Monticello, stands on a pedestal with this capital. The tobacco leaf is also employed in the "rosettes" of the frieze in the small dining room at Monticello. Since Jefferson was an architect of recognized ability, it might be inferred that he was the designer of this capital, and that this design, therefore, antedated that of Latrobe, since Jefferson died in 1826. However, among the drawings in the collection of Thomas Jefferson Coolidge, Jr., there is one (No. 149y) which is a sketch for a pedestal

[3] Battle, Kemp Plummer. History of the University of North Carolina. Vol. I, p. 617. 1907–12.

having a maize capital. This is referred to by Kimball,[1] as "utilizing Latrobe's maize capital," with a reference to a letter from Jefferson to Latrobe, dated August 27, 1816.[2] From these data it seems a highly probable inference that the tobacco capital on the pedestal was also designed by Latrobe. No doubt evidence exists among the Jefferson or the Latrobe papers confirming this inference.—C. S. G.

[1] Kimball, Fiske. Thomas Jefferson, Architect. Boston. Printed for private distribution. Riverside Press, Cambridge. 1916.

[2] Jefferson Papers. Library of Congress. Ser. 2. Vol. 54, No. 81.

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The Botanic Garden is open free to the public daily from 8 a.m. until dusk; on Sundays and Holidays it is open at 10 a.m.

Entrances.—On Flatbush Avenue, near Empire Boulevard and near Mt. Prospect Reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Crown Street.

To Assist Members and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one day in advance. No parties of less than six adults will be conducted.

To Reach the Garden take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, or Tompkins Avenue trolleys to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street or Vanderbilt Avenue trolleys to Prospect Park Plaza and Union Street. By Automobile from points on Long Island take Eastern Parkway west and turn left at Washington Avenue; from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway, turn left following Parkway to Washington Avenue; then turn right.

BROOKLYN BOTANIC GARDEN
PUBLICATIONS

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly (1929–1932); quarterly (1933–). Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, announcements of courses of instruction, seed list, guides, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others $1.00 a year. Circulates in 59 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Circulates in 47 countries.

Volume I. *Dedication Papers:* comprising 33 scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. 521 pages. Price $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. Price $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor, June 10, 1927. 151 pages. Price $1.60.

CONTRIBUTIONS. Established, April 1, 1911. Papers originally published in periodicals, reissued as "separates," without change of paging, and numbered consecutively. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume. Circulates in 34 countries.

63. Inheritance of resistance to loose and covered smut in a hybrid of Early Gothland and Victor oats. 10 pages. 1932.

64. Inheritance of resistance to loose and covered smut in hybrids of Hull-less with Early Gothland and Monarch oats. 28 pages. 1932.

65. Monographic studies in the genus Eleocharis—II. 34 pages. 1932.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the RECORD; see above.

Guide No. 5. The Rock Garden. 28 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 6. Japanese potted trees (Hachinoki). 11 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 7. The story of our boulders: Glacial geology of the Brooklyn Botanic Garden. 22 illustrations. Price, 35 cents. By mail, 40 cents.

SEED LIST. (*Delectus Seminum*) Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 160 botanic gardens and institutions located in 40 countries.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in coöperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription, $7.00 a year. Circulates in 53 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $4.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly. Subscription, $6.00 a year. Circulates in 37 countries.

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MAUDE E. VORIS, *Assistant Secretary*
NORMA STOFFEL BANTA, *Office Assistant*

MARIE-LOUISE HUBBARD, A.M., *Secretary to the Director*
FRANK STOLL, *Registrar and Custodian*

LAURA M. BREWSTER, *Stenographer*
PAULINE LEHMAN BROWN, B.A., *Stenographer*
EVELYN M. GAILER, *Stenographer*
L. CONSTANCE PURVES, B.A., *Stenographer*

BROOKLYN BOTANIC GARDEN

RECORD

EDITED BY

C. STUART GAGER

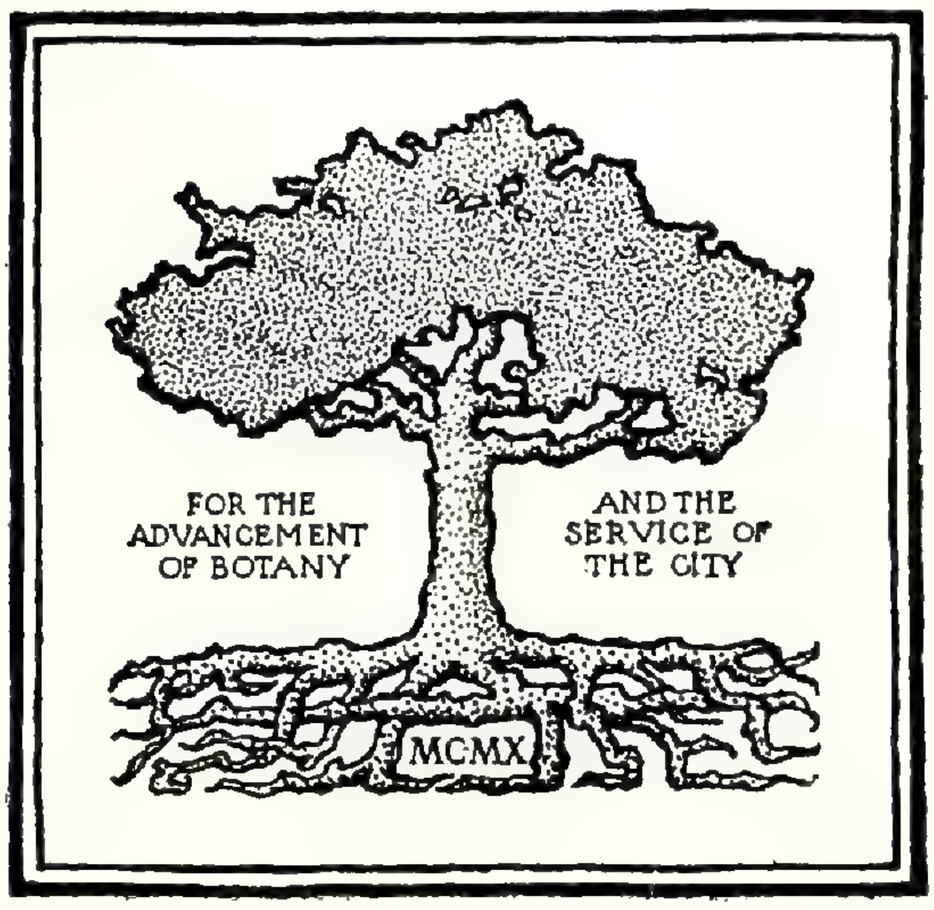

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TABLE OF CONTENTS OF VOLUME XXII

No. 1, January

PAGE

Delectus Seminum, Brooklyn 1932 (List of Seeds Offered in Exchange) 1
Notes to Accompany the Seed List—1932 14

No. 2, April

The Botanic Garden and the City .....Preceding page 17
Information Concerning Membership .....Preceding page 17
Privileges of Membership .....Preceding page 17
Forms of Bequest to the Brooklyn Botanic Garden ....Preceding page 17
Twenty-Second Annual Report of the Brooklyn Botanic Garden, 1932 .. 17
- Report of the Director 17
- Reports on Research for 1932 53
- Report of the Curator of Public Instruction 67
- Report of the Curator of Elementary Instruction 73
- Report on the Library 82
- Statistical Report on the Library 90
- Report of the Curator of Plants 91
- Report of the Assistant Curator of Plants 96
- Report of the Horticulturist and Head Gardener 102
- Report of the Resident Investigator (Ferns) 108
- Financial Statement for 1932 110
  - 1. Tax Budget Accounts 110
  - 2. Private Funds Accounts 112
  - 3. Summary of Total Maintenance Budget for 1932 117
  - 4. Tax Notes for Permanent Improvements 118
- Gifts Received During 1932 119
- Publications by the Botanic Garden Personnel During 1932 128
- Talks, Lectures, Addresses, and Papers Given During 1932 133
- Report on Brooklyn Botanic Garden Publications, 1932 142
- Field Trips Conducted 144
- Meetings of Organizations at the Garden, 1932 144
- Report on Photographic Work 146
- Officers of the Board of Trustees 147
- Members of the Board 147
- Woman's Auxiliary 148
- List of Members 150
- Summary of Membership 165

No. 3, July

PAGE
Exhibition of Plant Forms in Ornament 167
Little-Used Sources of Plant Forms for Design 168
Plant Forms in Design 172
Notes on an "American Order" of Architecture 177

No. 4. October

Prospectus: 1933–34 181
Cooperation with Local Schools 181
Bureau of Public Information 185
Docentry 186
Courses of Instruction 186
Miscellaneous 196
Other Educational Features 199
Index to Volume XXII 209

GENERAL INFORMATION CONCERNING THE ACTIVITIES OF THE BROOKLYN BOTANIC GARDEN

THE BROOKLYN BOTANIC GARDEN, established in 1910, is a department of the Brooklyn Institute of Arts and Sciences. It is supported in part by municipal appropriations, and in part by private funds, including income from endowment, membership dues, special contributions, and tuitions. Its articulation with the City is through the Department of Parks.

By an Agreement with the City of New York, the functions of the Garden have been defined as two-fold: first, the advancement of botanical science through original research; and second, the dissemination of a knowledge of plants.

The first of these activities is carried on by director, curators, resident investigators, fellows, and others, who devote all or a part of their time to independent investigation.

The second, the dissemination of botanical knowledge, is accomplished in the following ways:

I. By the teaching of classes—
   (*a*) of adults who are interested in some phase of pure or applied botany, or of horticulture;
   (*b*) of teachers of botany, biology, and nature study, who come for special courses on the subject matter or teaching methods of their subjects;
   (*c*) of children who come voluntarily outside of school hours;
   (*d*) of children who come with their teachers from public and private schools for special lessons on plant life and closely related subjects.

II. By lectures at schools, garden clubs, and elsewhere by staff members.

III. By broadcasting.

IV. By loan sets of lantern slides accompanied by lecture text, for use in the schools.

V. By the distribution to schools of study material for classes in botany, biology, and nature study.

VI. By public lectures and educational motion pictures at the Botanic Garden.

VII. By maintaining labelled collections of living plants, arranged systematically, ecologically, and otherwise on the grounds and in the Conservatories of the Garden.

VIII. By the herbarium, containing specimens of preserved plants from all parts of the world.

IX. By maintaining a reference library on plant life and related subjects, open free to the public daily (except Sundays and holidays).

X. By the following periodicals and publications issued by the Botanic Garden:

1. American Journal of Botany (Monthly, except August and September).
2. Ecology (Quarterly).
3. Genetics (Bimonthly).
4. Brooklyn Botanic Garden RECORD, including Annual Report and Guides. (Quarterly.)
5. Leaflets (Weekly or biweekly in Spring and Fall).
6. Contributions (Irregular).
7. Memoirs (Irregular).
8. Miscellaneous:

Syllabi of lectures.
Guide sheets for classes.
Announcement cards and circulars.
Bibliographies.
Miscellaneous books and booklets.

XI. By popular and technical articles in journals and the public press, including regular "News Releases" concerning Botanic Garden activities and events.

XII. By the maintenance of a Bureau of Public Information on all phases of plant life.

XIII. By providing docents to accompany members and others who wish to view the collections under guidance.

XIV. By the installation of botanical and horticultural exhibits at the Garden, the International Flower Show, and elsewhere.

XV. By cooperating with City Departments and other agencies in the dissemination of botanical knowledge.

The Brooklyn Botanic Garden is also taking an active part in the nation-wide movement for Scenic Preservation and legislation for the conservation of our native American plants.

A brief summary and report of the public educational work of the Garden from 1910 to 1928, with some attempt to set forth the fundamental principles upon which it is based, was published in the Brooklyn Botanic Garden RECORD for July, 1929. This is now out of print, but may be found on file at most of the larger libraries of the country.

CONTENTS

Page

I. Cooperation with Local Schools 181
II. Bureau of Public Information 185
III. Docentry 186
IV. Courses of Instruction 186
A. Courses for Members and the General Public 187
1. Fall and Winter Courses .....
2. Spring Courses .....
B. Courses for Teachers: Given in Cooperation with the Brooklyn Teachers Association 191
C. Children's Courses 193
D. Course for Student Nurses 195
E. Investigation 195
V. Miscellaneous 196
VI. Other Educational Features 199

Plantations, comprising Systematic Section, Local Flora Section, Rock Garden, Rose Garden, Japanese Garden, and various Horticultural Displays. Flower Days.

Conservatories, Herbarium, Library, Laboratory Building, Instructional Greenhouses, Children's Room, Children's Building, Children's Garden, Shakespeare Garden, Meridian Panel, Armillary Sphere, Labelled Boulders, Etc.

BROOKLYN BOTANIC GARDEN RECORD

VOL. XXII OCTOBER, 1933 NO. 4

PROSPECTUS: 1933–34

I. COOPERATION WITH LOCAL SCHOOLS

The Brooklyn Botanic Garden aims to cooperate in every practicable way with the public and private schools of Greater New York in all matters pertaining to the study of plants and closely related subjects. The purpose of the Garden in this connection is to supplement and enrich the school work in the way of instruction, demonstration methods, study material, etc., which otherwise would not be available.

Geography classes, as well as classes in nature study and botany, find the collection of useful plants in the economic plant house, and also the Japanese Garden, the Meridian Panel, and the Labelled Boulders, valuable adjuncts to their class work. Arrangements may be made by teachers of geography to have their classes study these collections under guidance. Illustrated lectures for geography classes may also be arranged for at the Garden.

To visiting college classes in geology and physiography the Botanic Garden offers interesting material for a study of glaciation. Notable features are a portion of the Harbor Hill terminal moraine (Boulder Hill), the morainal lakelet, the labelled glacial boulders, and the Flatbush outwash plain. See Guide No. 7, "*The Story of our Boulders: Glacial Geology of the Brooklyn Botanic Garden.*" See, also, pages 206–208 for statements concerning the Labelled Glacial Boulders, the Meridian Panel, and the Armillary Sphere.

A. Talks at Schools.—The principals of public or private schools may arrange to have talks given at the schools on various topics related to nature study, such as garden work with chil-

dren, tree planting, the conservation of wild flowers, and Arbor Day. If an illustrated lecture is desired, the lantern and operator must be provided by the school, but slides will be furnished by the Botanic Garden. Address the *Curator of Elementary Instruction* for a list of talks and for appointments.

B. School Classes at the Garden.—(*a*) Public or private schools may arrange for classes, accompanied by their teachers, to come to the Botanic Garden for illustrated lectures either by the teacher or by a member of the Garden Staff.

(*b*) Notice of such a visit should be sent at least *one week* previous to the date on which a talk is desired. Blank forms are provided by the Garden for this purpose. These talks will be illustrated by lantern slides, and by the conservatory collection of useful plants from the tropics and subtropics. Fall and spring announcements of topics will be issued during 1933–34.

(*c*) The Garden equipment, including plant material, lecture rooms, lantern, and slides, is at the disposal of teachers who desire to instruct their own classes at the Garden. Arrangements must be made in advance so that such work will not conflict with other classes and lectures. For High School and College classes address the *Curator of Public Instruction*. For Junior High and Elementary School classes address the *Curator of Elementary Instruction*.

(*d*) The principal of any elementary or high school in Brooklyn may arrange also for a series of six lessons on plant culture to be given to a class during the fall or spring. A small fee is charged to cover the cost of the materials used. The plants raised become the property of the pupils. The lessons will be worked out for the most part in the greenhouse, and the class must be accompanied by its teacher. This is adapted for pupils above the third grade.

C. Seeds for School and Home Planting.—Penny packets of seeds are put up by the Botanic Garden for children's use. In the early spring, lists of these seeds, order blanks for teachers and pupils, and other information may be secured on application to the *Curator of Elementary Instruction*.

D. Conferences.—Conferences may be arranged by teachers and principals for the discussion of problems in connection with gardening and nature study. Appointments must be made in advance. Address the *Curator of Elementary Instruction*.

E. Study and Loan Material.—To the extent of its facilities, the Botanic Garden will provide, on request, various plants and plant parts for study (also certain protozoa and sterilized nutrient agar.) When containers are necessary, as in the case of algae and protozoa, they must be furnished by the school.

Hitherto the Garden has performed this service gratis, but both on account of the increasing demand and because of the decrease in appropriations, it has become necessary to make a small charge for the material supplied or loaned. This charge will be made only for material furnished to junior high schools, high schools, and colleges. Material will continue to be supplied to elementary schools gratis as in the past. A price list of the various materials furnished will be mailed on request.

Requests for material should be made by mail or telephone (Prospect 9–6173) at least a day in advance: those from high schools, junior high schools, and colleges to Miss Hester M. Rusk; those from elementary schools to Miss Margaret M. Dorward. Elementary school material should be called for at the Information Booth on the ground floor; high school and college material at Room 325.

Material Usually Available

1. Algae:
   - Pleurococcus
   - Spirogyra
   - Vaucheria
   - Desmids
   - Blue-green algae: Oscillatoria and others.
2. Fungi:
   - Forms of fungi and lichens.
   - Plus and minus strains of bread mold.
   - Smut of oats or wheat.
   - Black stem rust of wheat.
3. Liverworts: Conocephalum and Lunularia.
4. Moss plants: protonema, " felt," and capsules.
5. Ferns:
   - Prothallia: for these a covered Petri dish or tin box should be sent.
   - Fronds with spores.

6. Selaginella with sporophylls.
7. Elodea—to show movement of protoplasm.
8. Corn or sorghum stems, dried.
9. Twigs to show opposite and alternate arrangement of buds.
10. Simple and compound leaves.
11. Mounted specimens of leaves of trees mentioned in the Syllabus of Nature Study.
12. Various seeds and fruits to illustrate methods of dispersal.
13. Material for the study of genetics:
    Pods of Jimson weed showing inheritance of smooth and spiny pods.
    Sorghum seeds for demonstrating inheritance of red seedling color.
    Pea seeds for showing Mendelian seed and seedling characters.
14. Specimens loaned for exhibit:
    Leguminous roots with tubercles.
    Riker mounts of powdery mildew, rusts and smuts, maple tar spot.
    Riker mounts of peas showing inheritance of seed characters.
    Oats showing inheritance of hull color.
    Corn showing inheritance of endosperm colors.
    Sorghum varieties and the F_1 hybrid.
    Types of cereals: wheat, oats, barley, rye, rice, corn.
    Eight types of wheat.
    Eight types of barley.
    Riker mounts of types of modified leaves.
15. Geranium, Coleus, Tradescantia—variegated green and white, loaned for photosynthesis experiment.
16. Sensitive plants (*Mimosa pudica*).
17. In spring, for school gardens, the surplus supply of seedlings from Botanic Garden classes.
18. Protozoa: Paramoecium, Euglena, and others.
19. Agar. Petri dishes sent in *clean and dry* two weeks in advance, or test tubes or flasks sent in one week in advance, will be filled with sterilized nutrient agar for the study of bacteria and molds.

F. Demonstration Experiments.—Teachers may arrange to have various physiological experiments or demonstrations conducted at the Garden for the benefit of their classes. Communications in regard to these matters should be addressed to the *Curator of Public Instruction.*

G. Loan Sets of Lantern Slides.—Sets of lantern slides have been prepared for loan to the schools. Each set is accompanied by a short lecture text of explanatory nature. In all cases these sets must be called for by a responsible school messenger and returned promptly in good condition. Address, by mail or telephone, Mr. Frank Stoll. The subjects now available are as follows. Other sets are in preparation.

1. Plant Life
2. Spring Wild Flowers
3. Common Trees
4. Fall Wild Flowers
5. Forestry
6. Conservation of Native Plants

II. BUREAU OF PUBLIC INFORMATION

Consultation and advice, and the facilities of the laboratories, library, and herbarium are freely at the service of members * of the Botanic Garden and (to a limited extent) of others with special problems relating to plants or plant products, especially in the following subjects:

1. Plant diseases and determination of fungi.
2. Plant geography and ecology.
3. Determination of flowering plants.
4. The growing of cultivated plants and their arrangement; also their adaptation to soils, climate, and other factors.
5. The care of trees, shrubs, and lawns, and general gardening problems.

Inquiries should be directed to the *Curator of Public Instruction,* preferably by letter.

Determination of Specimens.—If the identification of plants is desired, the material submitted should include flowers, and fruit when obtainable. Identification of a single leaf is often impossible.

* For information as to membership consult the third page of the cover of this Prospectus.

For identification of plant diseases, representative portions of the part diseased should be sent.

III. DOCENTRY

To assist members and others in studying the collections the services of a docent may be obtained. Arrangements should be made by application to the *Curator of Public Instruction* one week in advance. No parties of less than six adults will be conducted. This service is free of charge to members; to others there is a charge of 50 cents per person. For information concerning membership in the Botanic Garden see page 3 of the cover of this PROSPECTUS.

IV. COURSES OF INSTRUCTION

Each of the courses here announced is a unit and not a series of unrelated lectures. Students must enroll for an *entire course*. No registrations will be made for separate class exercises.

Courses of instruction are offered in Botany, Gardening, and Nature Study, and are divided into four classes:

A. For members and the general public (" A " courses, p. 187)
B. For teachers (" B " courses, p. 191)
C. For children (" C " courses, p. 193)
D. Other courses of a special nature (" D " courses, p. 195)

No course will be given when less than ten persons apply for registration. Since registration in many of the courses is restricted to a fixed number on account of the limited space available in the greenhouses, and for other reasons, those desiring to attend are urged to send in their application for enrollment and the entrance fee to the Secretary, Brooklyn Botanic Garden, several days in advance of the first exercise. This avoids delay at the beginning of the first exercise, ensures a place in the course, and enables the instructor to provide adequate material for the class.

Persons are requested not to register in any course, unless they are reasonably confident that they can attend the sessions of the class regularly and throughout. This is specially important where the number to be enrolled is limited. To register and not attend

will quite certainly deprive someone else of the privilege of attending.

The following equipment is available for the courses:

1. Three *Classrooms* (in addition to the Boys' and Girls' Club Room in the Laboratory Building), equipped with stereoscopes and views, a stereopticon, plant collections, economic exhibits, models, and other apparatus and materials for instruction.

2. Two *Laboratory Rooms,* with the usual equipment for plant study.

3. Three *Instructional Greenhouses,* for the use of juvenile as well as adult classes, for instruction in plant propagation and related subjects.

4. *The Children's Garden,* on a piece of land about three-quarters of an acre in extent, in the southeast part of the Botanic Garden, divided into about 150 plots which are used throughout the season for practical individual instruction in gardening.

5. *The Children's Building,* near the north end of this plot, containing rooms for conferences and for the storage of tools, seeds, notebooks, special collections, etc.

6. *The Auditorium,* on the ground floor, capable of seating 570 persons, and equipped with a motion-picture machine and stereopticon, and electric current, gas, and running water for experimental lectures.

In addition to these accommodations, the dried plant specimens in the herbarium, the living plants in the conservatories and plantations, and the various types of gardens are readily accessible, while the main library and children's library, which contain a comprehensive collection of books on every phase of gardening and plant life, may be consulted freely at any time. See also pages 199–206.

A. Courses for Members and the General Public

Although the following courses are designed especially for Members of the Botanic Garden, they are open (unless otherwise specified) to any one who has a general interest in plants. Teachers are welcome. Unless otherwise specified, these courses are *free to members;* * of others a fee is required, as indicated. In

* For information concerning membership in the Brooklyn Botanic Garden consult the third page of the cover of this PROSPECTUS.

courses where plants are raised, these become the property of the class members.

A13. Flowering Plants of Greater New York: Fall Course.—*(Not offered in 1933.)*

A27. Three lectures and demonstrations for Teachers.—

September 25. The School Garden in the Fall. Miss Jenkins.

October 2. Bulbs for the Classroom. Miss Shaw.

October 9. The School Window Box and Terrarium. Miss Miner.

Mondays, 4 p.m., *September 25 to October 9. No fee.*

A26. Plant Families: Fall Course.—Five outdoor sessions in the Botanic Garden, intended chiefly for those who have taken Course **A8** (see p. 190), of which this is a continuation and résumé. The main steps of plant evolution, the structure of flowers, and the interdependence of plant and animal evolution are considered. *Fee, $5. Two divisions, Wednesdays: Division I,* 10:45 a.m. *to* 12:00; *Division II,* 4:15 *to* 5:30 p.m., *October 4 to November 1.*

Dr. Gundersen.

A20. Advanced Course in Gardening.—Ten lessons. This course presupposes a knowledge of the elements of gardening equivalent to that contained in courses **A1** and **A25**. It consists of lectures illustrated with lantern slides and living material, and includes frequent tours in the Botanic Garden where the various types of gardens and other subjects of the lectures will be demonstrated. The subjects treated are as follows:

Water Gardens, Rock Gardens, Roses, Perennial Gardens, Trees and Shrubs, Plant Propagation, Insect Pests, Iris, Plant Diseases, Plant Breeding.

Fee for members of the Garden $5; for non-members $15. Tuesdays, 11:00 a.m. *to* 12:30 p.m., *October 24 to January 16. (Omitting November 7, December 26, and January 2.)*

Mr. Free and Dr. Reed.

A1. Plants in the Home: How to Grow Them.—Five talks with demonstrations. Practice in potting, mixing soils, making cuttings, etc. This course deals with the principles to be followed in raising plants. The members of the class have the privilege of keeping the plants they have raised. *On account of restricted*

space in the greenhouse, this class must be limited to 40. Registration according to the order of application. Fee, $6 (including laboratory fee). Wednesdays, 11 a.m., *November 1 to December 6. (Omitting November 29.)* Mr. Free.

A24. The Child and His Garden.—A series of short courses in nature study and garden work for boys and girls, especially planned for private schools and for those children who cannot attend Saturday morning classes. Parents are invited to come with their children, in order to become familiar with the modern educational principles underlying the work. Fall courses of four to six lessons are given during October and November in the greenhouse and on the grounds, as follows:

Greenhouse work in plant propagation: How to start plants from bulbs; cuttings; leaf cuttings; desert gardens.

Outdoor nature work: Common trees and how to know them; plants that have bright berries in the fall; tree fruits (making a collection); the garden in the fall.

(For spring subjects see A24, page 190.) *Groups limited to twenty children each. Fee* for each course, *$1.00. Hours to be arranged* by parents or schools. Miss Shaw.

A23. Flower Arrangement.—Five sessions, sponsored by the Woman's Auxiliary. This includes discussions of line and color, color harmony, the scientific principles on which these are based, and the choice of containers suitable for particular combinations. The principles of Japanese flower arrangement are also considered and demonstrated. Problems are worked out by the class. *Fee, $6. Wednesdays,* 11 a.m., *January 10 to February 7.* Lecturers to be announced.

A25. The Fundamentals of Gardening.—A course in first principles, designed for those who have had little previous experience but who desire to carry on practical work in their own gardens. The lessons are as follows:

The soil. Miss Shaw.
Planning the garden. Miss Dorward.
Planting seed in the greenhouse. Miss Shaw.
Pruning trees and shrubs. Miss Dorward.
Pricking out seedlings in the greenhouse. Miss Shaw.
Outdoor demonstration of spring garden operations. Miss Shaw and Miss Dorward.

Fee, $7 (including laboratory fee). Tuesdays, 11 a.m., *February 20 to March 27.* Miss Shaw and Miss Dorward.

A29. Practical Gardening.—A Saturday afternoon course for men and women. Five talks with demonstrations. Subjects discussed are: Soil management; planting; pruning; combatting plant pests; plant propagation, including budding and grafting. At the close of each session the class will be afforded an opportunity to bring up special garden problems for discussion. *Fee, $5. Saturdays,* 3 p.m., *February 3 to March 3.* Mr. Free.

A18. Ornamental Shrubs: Spring Course.—Ten outdoor sessions held on the grounds of the Botanic Garden, dealing with the shrubs used in ornamental planting. About two hundred species or varieties of shrubs and small trees are studied at the time of their flowering. This is continued by a course of five lessons in the fall of 1934. *Fee, $10. Two divisions, each limited to 25 members, enrolled in the order of application. Thursdays: Division I,* 10:45 a.m. *to* 12:00; *Division II,* 4:15 *to* 5:30 p.m., *April 12 to June 14.* Dr. Gundersen.

A8. Plant Families: Spring Course.—Ten outdoor lessons in the Botanic Garden, taking up the structure and possible lines of evolution of flowers, and the characteristics of the more important families. (*Not offered in 1934.*) Dr. Gundersen.

A11. Flowering Plants of Greater New York: Spring Course.—(*Not offered in 1934.*) Dr. Svenson and Miss Rusk.

A28. The School Garden.—Four talks, relating specifically to school gardens. *For teachers only.*

April 16. Indoor Work for the Outdoor Garden.
I. Plans.
II. How to start seedlings (greenhouse work).
April 23. Outdoor Planting Preparations.
April 30. What and How to Plant.
May 7. Planting the Garden (outdoor work).

Fee, $1.00. Mondays, 4:00 p.m., *April 16 to May 7.*
Miss Jenkins.

A24. The Child and His Garden: Spring Series.—For description see A24, page 189. Spring subjects are as follows: Course I, Indoor work: How to start plants from seed; how the seed germinates and grows; the story of a plant, including pollina-

tion and cross-pollination; how to start a little garden. Course II, Outdoor work: Trees in their spring garb; how to start the outdoor garden; spring bloom among the shrubs. (Children who have taken the spring course during 1933 may arrange for advanced work in nature study and gardening.) *Fee* for each course, *$1.00. Hours to be arranged.* Miss Shaw.

B. Courses for Teachers: Given in Cooperation with the Brooklyn Teachers Association

These courses have been accepted by the Brooklyn Teachers Association, and appear in its Syllabus of Courses. On satisfactory completion of each course, the student is awarded a certificate by the Brooklyn Teachers Association, in cooperation with the Brooklyn Botanic Garden. The courses are also accepted by the New York Board of Education for credit toward higher teaching licenses, one credit being granted for each 15 hours (with the exception of "B8, Plant Culture"). Through an agreement made in January, 1931, with Long Island University, undergraduate credit for these courses will be allowed toward fulfilling the requirements for a university degree, provided the admission requirements at the University and the laboratory requirements have been fulfilled. By arrangement with the institution concerned, these credits may also be used as undergraduate credits in other colleges and universities. Nature materials used in the courses, and plants raised become the property of the student.

Members of the Garden are entitled to a 50 per cent. discount from the regular fee for all "B" courses; from other persons the indicated fee is required. *No course will be given when less than ten persons apply.*

B1. General Botany.—A two-year course of thirty class meetings each year. Also thirty two-hour laboratory periods, the time to be arranged when the class is organized. The first year (A) is spent on the structure and functions of the higher plants. Four credits. The second year (B) deals with representatives of all the great groups of plants; this includes a study of the life histories and relationships of the lower forms, and practical work on the identification of flowering plants, chiefly of the New York region. Four credits. In 1933–34 the second half of the course

(B) will be given. The first half is not a prerequisite for the second, but those who have never studied botany before are advised to take (A) first. *Fee, $15 each year. Thursdays,* 4 p.m., beginning *September 28.* Miss Rusk.

B2. Nature Study.—Thirty sessions. This course is based on the New York City outline of nature study for the elementary grades. Mounts, charts, and diagrams are made. The student becomes familiar with actual material. The course is entirely practical, work being done in both field and laboratory. Two credits. *Fee, $15. Tuesdays,* 4 p.m., beginning *October 3.* Miss Miner.

B3. Principles of Agriculture and Horticulture.—Thirty sessions. *For teachers only.* The principles of horticulture are considered and applied in a practical way through greenhouse, laboratory, and lecture work. The greenhouse work includes the following subjects: plant propagation by means of bulbs, rhizomes, roots, seeds, etc.; the care of the greenhouse; house plants; window-box materials; fertilizers. Insect and fungous pests, grafting, and pruning are also included from both a practical and a theoretical point of view. Two credits. *Class limited to 60 members. Fee, $15. Wednesdays,* 4 p.m., beginning *September 27.* Miss Dorward.

B4. Educational Principles of Children's Gardening and Nature Study.—(*Not offered in 1933–34.* For garden work see courses A24, A27, and A28.) Miss Shaw.

B5. Children's Garden Practice.—(*Not offered in 1933–34.* For garden work see courses A24, A27, and A28.) Miss Shaw and Miss Jenkins.

B7. Greenhouse Work.—Thirty sessions. A course *for teachers only.* Lessons in repotting; forcing blooming plants; methods of propagation; insect pests and plant diseases; making dish gardens; preparing for the outdoor garden. Most of this work is carried on in the greenhouses. Emphasis will be laid on problems of a practical nature. Limited to those who have taken B3 and planned to follow this course. Two credits. *Fee, $15. Tuesdays,* 4 p.m., beginning *October 3.* Miss Dorward.

B8. Plant Culture.—A course of twenty weeks duration for those who have taken B3 and B7. Work entirely in the green-

house. *No Board of Education credits are given for this course. Fee, $15. Thursdays,* 4 p.m., beginning *October 19.* Miss Shaw.

B9. Economic Plants.—Thirty sessions. The most important economic plants of the world are considered—their history, culture, formation of their useful products, and the extraction and preparation of the latter by man. Herbarium specimens and other material, as well as living plants in the conservatories and plantations of the Garden will be used for demonstrations. Because of its practical applications, this course will be of especial value to teachers. Two credits. *Fee, $15. (Not offered in 1933–34).*
Dr. Cheney.

B10. Trees and Shrubs of Greater New York.—Twenty two-hour sessions. A course of outdoor lessons in the parks and woodlands of Greater New York, the principal object being to gain a ready acquaintance with the common trees and shrubs of the eastern United States, which are well represented in this region. The species are considered in systematic order, in both winter and summer conditions, and the features pointed out by which they may most easily be recognized. Two credits. *Fee, $15. Saturdays,* 2:30 p.m., *September 30 to December 2;* and *April 14 to June 16* inclusive. Dr. Graves, Miss Vilkomerson and Mr. Doney.

C. Children's Courses

The following courses are open to all boys and girls. Enrollment in these courses entitles the boy or girl to membership in the Boys' and Girls' Club of the Brooklyn Botanic Garden. Papers by members of the Club, on various botanical and horticultural subjects, are read at the meetings, and the speakers are then entitled to a silver pin, providing they have satisfactorily completed work for their bronze medal and have received it. For information concerning the Children's Room, the Children's Building, and the Children's Garden, see pages 205–206.

C1. Fall Greenhouse Work.—The following courses are given for boys and girls interested in greenhouse work and botanical nature study. *The fee is ten cents.*
Miss Dorward, Miss Jenkins, and Miss Miner.

Class A.—Open to boys and girls from eight to twelve years old. *Saturday* mornings at 9:15. *October 21 to December 23.*

Class B.—Open to boys and girls twelve years of age and over. *Saturday* mornings at 10:00. *October 21 to December 23.*

C2. Special Activities.—Special work as applied to greenhouse and garden activities. Members for this class will be selected from honor students in the fall courses. Work is open only to boys and girls fourteen years old and over. *No fee.* Given in January and February, 1934. Miss Shaw and Miss Dorward.

C3. Preparation for the Outdoor Garden.—The following classes are open to boys and girls during the spring of each year. The courses are planned for a better understanding of plant life and so that the outdoor garden may become a more intelligent piece of work. *On account of limited space in the Children's Greenhouse, classes are limited to twenty. The fee for each is fifteen cents to cover the cost of material.*

Miss Dorward, Miss Jenkins, and Miss Miner.

Class A.—Open to boys and girls from eight to twelve years old. *Saturday* mornings at 9:15. *February 24 to April 28.*

Class B.—Open to boys and girls twelve years of age and over. *Saturday* mornings at 10:00. *February 24 to April 28.*

C4. Advanced Work for Older Boys and Girls.—How to raise plants, mix soils, transplant, start seedlings for outdoor gardens, etc. Boys and girls who have taken spring courses under C5 are eligible for advanced work. *The fee for the course is twenty-five cents.* Each student may take home his plants and seedlings. This course is open to both boys and girls over twelve years of age. *Saturday* mornings at 9:30, *February, 1934.*

Miss Dorward.

C5. The Beginners' Outdoor Garden.—Open annually to 150 boys and girls who carry on their projects in gardening on plots 8 ft. by 10 ft. No person is eligible for a garden who has not been a member of spring classes. *Fee, twenty-five cents. Saturday* mornings, 9–12, *May 12 to October 6.*

Miss Shaw and Assistants.

C6. The Advanced Outdoor Garden.—Open to 75 boys and girls who have had several seasons in the Beginners' Garden (C5). All candidates must have been in spring classes. *Fee, fifty cents. Saturday* mornings, 9–12, *May 12 to October 6.*

Miss Jenkins and Assistants.

C7. Junior Garden Assistants.—Open to older boys and girls or to those who have mastered Courses C2 and C4. Size of plot 10 ft. by 15 ft. Registration date: *May 5. No fee.*

Miss Jenkins.

C9. Nature Study for Boy Scouts, Girl Scouts, Camp Fire Girls, Scout Leaders, and Others.—Short courses of at least four periods each, with talks, demonstrations, and field trips in the grounds of the Botanic Garden and Prospect Park to study trees, shrubs, etc. The instruction and schedule dates will be adapted to meet the needs of the various groups that apply. *Open only to groups of at least ten persons.* Hours to be arranged. *No fee.*

Dr. Graves, Miss Miner, and Assistants.

C10. Special Work for High School Pupils.—A course in gardening or greenhouse work for high school pupils. Classes to be arranged for by the high school teacher. *Fee for materials used.*

Miss Shaw and Assistants.

D. Course for Student Nurses

D1. General Botany With Special Reference to Medicinal Plants.—A course of 10 spring and 10 fall conferences, demonstrations, and field trips for student nurses. The general principles governing the life of plants, as well as the use and care of flowers and potted plants in the sick room, will be considered. Special attention will be paid to the identification of officinal plants in the field. Hours to be arranged. *No fee.* Dr. Graves.

E. Investigation

1. *Graduate Work for University Credit*

By the terms of a cooperative agreement between New York University and the Brooklyn Botanic Garden, properly qualified graduate students may arrange to carry on independent investigations in botany at the Garden under the direction of members of the Garden Staff, who are also officers of instruction in the Graduate School of the University. The advantages of the laboratory, herbarium, and collections of living plants at the Garden are freely at the disposal of students registered at New York University for such work. Such properly enrolled graduate students are charged

no additional fees by the Garden. The following courses are approved by the faculty of the Graduate School of New York University and are given credit as full courses:

E6. Research in Mycology and Plant Pathology.—Investigation of problems relating to fungi and fungous diseases of plants. Dr. Reed.

E8. Research in Forest Pathology.—Investigation of the diseases of woody plants. Dr. Graves.

E9. Research in Systematic Botany of the Flowering Plants.—Investigation relating to the classification of the higher plants. Dr. Gundersen and Dr. Svenson.

2. Independent Investigation

The facilities of the laboratories, conservatories, library, and herbarium are available to qualified investigators who wish to carry on independent researches in their chosen field. There is a charge of $25 per year, payable to the Botanic Garden.

V

MISCELLANEOUS

Press Releases

In order to keep the public informed of events at the Garden, news items are sent at fairly regular and frequent intervals to the metropolitan dailies and to many of the suburban papers. These news releases consist of announcements of the periods when the principal floral displays are at their best, of the acquisition of new plants, the blossoming of rare species, improvements in the plantations, the installation of new collections and exhibits, the results of research and exploration, etc. The beginning of the various public courses, as well as public lectures and meetings of various societies at the Garden, are also announced through the public press.

Circulars of Information

Circulars descriptive of the various courses and lectures are distributed, without charge, according to a regular mailing list which includes all the libraries and schools of Greater New York, Botanic

Garden members, and others. Requests to be placed on this mailing list should be addressed to the *Curator of Public Instruction.*

Popular Publications

Leaflets.—The publication of the Brooklyn Botanic Garden *Leaflets* commenced in 1913. Approximately ten numbers—sometimes more—constitute a Series, one series being issued each year. The current series is Number XXI. At the end of every four years, for convenience in binding, a table of contents of the *Leaflets* published during the four year period is issued.

The purpose of the *Leaflets* is primarily to present popular information about plant life in general for teachers and others, and to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue. The *Leaflets* are free to members of the Garden and (on request) to teachers in the schools of Greater New York. For others, the subscription is 50 cents per year, or 5 cents a number (4 pages); double or triple numbers (8 or 12 pages) at the same rate.

Besides the *Leaflets,* numerous popular articles on various phases of plant life and gardening are written by members of the staff for publication in periodicals and newspapers.

The Plant World.—By C. Stuart Gager. A popular introduction to the more interesting facts concerning the plant life of the earth, and the importance of plants in our daily lives. 136 pages; 79 illustrations. Price 75 cents. On sale at the Information Desk and Entrance Gates, and by mail.

A Teaching Guide to the Trees and Shrubs of Greater New York.—By Arthur H. Graves and Hester M. Rusk. A handbook used in Botanic Garden classes, of brief, non-technical descriptions of the woody plants of the Greater New York region, with the characters by which they may be recognized in summer or winter. Keys, a glossary, and index are appended. IX + 76 pages. Price 75 cents. On sale at the Information Desk and Entrance Gates, and by mail.

Illustrations of Flowering Plants of the Middle Atlantic and New England States.—By the late George T. Stevens, M.D. Edited by Alfred Gundersen. Contains 199 plates and index of about 1500 species of the commoner flowering plants, exclusive of

the grasses and sedges. Reprinted primarily for use in Brooklyn Botanic Garden classes. Price $1.00. On sale at the Information Desk and Entrance Gates, and by mail.

Guide Books, Maps, and Souvenir Postcards of the Garden

During the last few years, Guide Books have been published from time to time, as special numbers of the *Brooklyn Botanic Garden Record*, based upon and explaining various Botanic Garden features and exhibits.

Each of these publications is more than a guide to an exhibit; it is an elementary treatise on the general subject illustrated by the Garden feature or exhibit. In this way the Guides have value even for those who may not be able to visit the Botanic Garden. The following numbers have been published:

Guide No. 2. Gardens within a garden: A general guide to the grounds of the Brooklyn Botanic Garden. By C. Stuart Gager. May, 1929. 36 pages, 16 illustrations and map. Price, 25 cents. Out of print.

Guide No. 3. The story of our metate: A chronicle of corn. By F. W. Hodge. November, 1929. 25 pages, 14 illustrations. Price, 25 cents.

Guide No. 4. The Japanese Garden of the Brooklyn Botanic Garden. By Bunkio Matsuki. July, 1930. 38 pages, 20 illustrations. Price, 35 cents; by mail, 40 cents. Out of print.

Guide No. 5. The Rock Garden of the Brooklyn Botanic Garden. By Montague Free. May, 1931. 55 pages, 28 illustrations. Price, 35 cents; by mail, 40 cents.

Guide No. 6. Japanese potted trees (Hachinoki). By Bunkio Matsuki. November, 1931. 16 pages, 11 illustrations. Price, 35 cents; by mail, 40 cents.

Guide No. 7. The story of our boulders: Glacial geology of the Brooklyn Botanic Garden. By C. Stuart Gager and Ernst Antevs. May, 1932. 43 pages, 22 illustrations. Price, 35 cents; by mail, 40 cents.

Guide No. 8. The story of fossil plants. Guide to the eight transparencies in Conservatory House No. 2. By Edward W. Berry. July, 1932. 29 pages, 8 illustrations. Price, 35 cents; by mail, 40 cents.

These Guides are mailed free, as published, to members of the Garden. Similar guides are in preparation and will be published from time to time.

A detailed map of the Garden, showing not only the various types of gardens included in the Botanic Garden area, but especially the location of the various orders and families in the Systematic Section, is appended to the General Guide. Copies are on sale at 5 cents each.

A colored picture map of the Garden, 7½ x 3½ feet, designed and executed by Miss Helen Sewall, is on view in the Laboratory Building. This map was presented to the Garden at the Annual Spring Inspection, May 14, 1929, as a memorial to the late Dr. Glentworth R. Butler by members of the Woman's Auxiliary and other friends of Dr. Butler. Photographs of this map (in black and white, 6½ x 4¼ inches) may be had at 20 cents each.

Souvenir postcards, in colors, may be had at 15 cents a set (6 cards); two for 5 cents; 3 cents each. The subjects are: Scene in the Children's Garden; The Brook; Daffodils in the Lawn; The Lake; Children's Building and Formal Garden; The Rock Garden (Waterfall and Iris); The Japanese Garden (Wisteria); Inflorescence of Sago Palm.

Orders for guide books, maps, and souvenir postcards, accompanied by remittance, should be sent to *The Secretary.* These articles may also be obtained at the Information Desk in the Laboratory Building, and at the Entrance Gates.

VI

OTHER EDUCATIONAL FEATURES

Plantations

The plantations comprise the following sections:

1. General Systematic Section (trees, shrubs, and herbaceous plants arranged according to orders and families).
2. Local Flora Section (Native wild flower garden). Arrangement ecological.
3. Ecologic Garden.
4. Rock Garden.

5. Japanese Garden.
6. Rose Garden.
7. Iris Garden.
8. Water Gardens (Lake, Brook, Swamp, Bog, Pools).
9. Children's Garden.
10. Shakespeare Garden.
11. Horticultural Garden.
12. Conservatory Plaza (Pæonies, Water Lilies, Hollyhocks).
13. Laboratory Plaza (Magnolias).
14. Experimental Garden; Test Garden for beardless Iris.
15. Nursery.

As noted under *Docentry* (p. 186) arrangements may be made for viewing the plantations under guidance. They are open free to the public daily from 8 a.m. until dusk; on Sundays and holidays from 10 a.m. until dusk.

Systematic Section

The main part of the outdoor plantations is devoted to the Systematic Section, which extends from north to south through the central part of the Garden. Here the plants are grouped according to their botanical relationships, in orders, families, and genera, following approximately the Engler system of plant classification. From the simpler and more primitive types of plants at the north end, to the more highly developed groups at the south, the Systematic Section comprises representative members of the families of plants which are hardy or semi-hardy in this climate. In accordance with this arrangement, the ferns and the conifers and other gymnosperms are at the northern end. Then follow the trees, shrubs, and herbaceous plants of the various families of dicotyledons. Along the east side of the brook are the polypetalae. Along the west side of the brook are the catkin-bearing trees and shrubs, the monocotyledons, and the sympetalae. Wherever possible, the plants chosen to represent their groups are those which are of interest from both botanical and horticultural points of view.

Local Flora Section

This is an area of about two acres devoted to plants native within approximately 100 miles of Brooklyn (the Torrey Botanical Club

range). The following ecological units are represented: bog, sand barren, pond, meadow, and woodland. Nearly all the native plants of general interest are well established here, with the exception of the limestone (calciphile) ferns, for which there is as yet no suitable place. Although the section is not yet open to the general public, arrangements may be made with the *Curator of Public Instruction* for its inspection by botany classes, to whose needs this area is especially adapted.

Rock Garden

The Rock Garden, constructed in the spring of 1916, is, in point of time, perhaps, the first rock garden of any considerable size in a public garden or park in the United States. The rocks used in its construction are glacial boulders which were uncovered in the course of grading operations on other parts of the grounds; they are the only "native" rocks on Long Island, with the exception of one small outcrop on the northwest shore. The general idea in making the garden was that of representing a boulder-strewn slope, but this design, of necessity, was modified in places to provide proper cultural conditions as to drainage, depth of soil, and shade. The garden is planted with almost eight hundred species and varieties of alpine, saxatile, and other plants suitable for rock garden culture.

Although the rock garden enthusiast may expect to find something of interest in bloom during every month of the year, it is in April, May, and June that the rock garden provides its greatest display of blossoms. Persons interested in rock gardening will find Guide No. 5, *The Rock Garden of the Brooklyn Botanic Garden,* helpful; also, *Leaflets,* series XI, No. 6, *The Rock Garden.*

Rose Garden

The Rose Garden, occupying about one acre in the northwest part of the Botanic Garden, was formally opened to the public on Sunday afternoon, June 24, 1928. This garden was made possible by a gift of $10,000, later increased to $15,000, from Mr. and Mrs. Walter V. Cranford, of Greenwich, Connecticut.

The general plan of the Garden is as follows. At the north end, entrance is gained through a Doric pergola. Three parallel

rows of beds extend to the southward from the pergola, as far as the pavilion. In the central row of beds, varieties of hybrid perpetuals have been planted along with many of the small *polyantha* type; each of the two side rows contains varieties of hybrid teas. In the arrangement of these varieties the older forms appear at the beginning, near the pergola, the most recent productions near the pavilion, with the intermediate forms in chronological sequence between. Varieties of pillar and post roses are planted at regular intervals, on suitable supports, in the beds, with standards between the beds of the side rows. The trellis surrounding the garden, and also the pergola and pavilion, furnish support for climbing roses, while the marginal beds along the trellis are for wild species and their derivatives. South of the pavilion, three additional beds are devoted to historical roses, *i.e.*, those mentioned in ancient literature, and to roses of commercial use.

The Rose Garden is open to the public from 9 a.m. to 5 p.m. on weekdays (except holidays) during the rose season, and from 9 a.m. to 7 p.m. in June. Children are admitted only when accompanied by responsible adults.

Japanese Garden

The Japanese Garden, first opened to the public in 1915, was a gift to the Botanic Garden from Mr. Alfred T. White, "the father of the Botanic Garden." The design, by the Japanese landscape architect, Mr. Takeo Shiota, carries out faithfully the Japanese idea of a *Niwa*, or landscape garden. From the tea house (near the east entrance) one can see the *machiai* or "rest house," the island with the drum bridge, bronze storks, stone and wooden lanterns, the waterfalls, and the wooden Torii standing in the lake, like the one at Miyajima, Japan. Since January 1, 1919, the Garden has been in charge of Miss Mary Averill, honorary curator of Japanese gardening and floral art, and has been steadily improved, under her supervision, by Japanese gardeners. For details and explanations of the meaning of the various features see "The Japanese Garden of the Brooklyn Botanic Garden": Guide No. 4. (*Brooklyn Botanic Garden Record* **19**: 197–234. July, 1930.)

Flower Days

In order to afford members of the Garden and friends whom they may invite, an opportunity to see, under expert guidance, some of the most conspicuous and interesting floral displays of the Garden; to assist them toward solving some of their own gardening problems; and to enable them to meet for discussion, a series of special days, called Flower Days, was inaugurated in 1927. The dates selected are those in which the particular flowers furnishing the theme for discussion are in their prime. Up to and including 1933 the following "Days" have been observed:

Crocus Day
Daffodil Day
Tulip Day
Rock Garden Day
Japanese Garden Day
Iris Day
Japanese Iris Day
Rose Garden Day (June)
Water Garden Day
Fall Rose Garden Day
Canna Day
Chrysanthemum Day

On each of these occasions a specialist gives an illustrated talk on the flower of the Day, followed by a tour of inspection of the flowers in bloom on the grounds of the Garden. The speakers are either members of the Garden staff who have made a special study of the flowers in question, or invited experts in their breeding or growing. During the outdoor inspection, members may discuss with the leader questions of desirable varieties, culture, disease, etc. On the return to the Laboratory Building, tea is served. The exercises commence at 3:30 p.m.

In 1933 three "Days" were devoted to Japanese Iris, with Rotunda talks, illustrated with cut flowers, and inspection of the Test Garden and public display each morning and afternoon.

Conservatories

The Garden conservatories contain a collection of tender and tropical plants. Of special interest for teachers of nature study and geography are the following useful plants from the tropics and subtropics: banana, orange, lemon, lime, kumquat, tamarind, West Indian cedar (the source of the wood used for cigar boxes), eucalyptus, Manila hemp, sisal, pandanus (source of the fiber used

for making certain kinds of fiber hats), fig, grapevines from north and south Africa, date palm, coconut palm, chocolate tree, coffee, tea, ginger, bamboo, mahogany, balsa, cocaine plant, black pepper, annatto (used in coloring butter and cheese), cardamom, olive, pomegranate, logwood, durian, mango, sugar cane, avocado (so-called "alligator pear"), West Indian and other rubber plants, banyan, religious fig of India, and numerous others.

It may be of interest to teachers that the nine extant genera of cycads are now represented in House 12. To reach the Cycad House take the first door to the *left* after entering the central or Economic House and pass through to the end house.

The Conservatories are open April 1 to October 31, 10 a.m.–4:30 p.m. (Sundays, 2–4:30); November 1 to March 31, 10 a.m.–4 p.m. (Sundays, 2–4).

Herbarium

The Garden herbarium consists at present of about 200,000 specimens, including phanerogams, ferns, mosses, liverworts, lichens, parasitic and other fungi, algae, and myxomycetes. This collection may be consulted daily (except Sundays and holidays) from 9 a.m. until 5 p.m., Saturdays from 9 a.m. to 12 m. Specimens submitted for identification will be gladly received.

Library

The rapidly growing library of the Garden comprises at present more than 17,000 volumes and more than 13,000 pamphlets. This is not a circulating library, but is open free for consultation to all persons daily (except Sundays and holidays) from 9 a.m. until 5 p.m. (Saturdays, 9 to 12). More than 900 periodicals and serial publications devoted to botany and closely related subjects are regularly received. These include the transactions of scientific societies from all quarters of the globe; the bulletins, monographs, reports, and other publications of various departments of the United States Government, as well as those of foreign governments, and of all state agricultural experiment stations and agricultural colleges; the publications of research laboratories, universities, botanic gardens, and other scientific institutions of the world,

as well as the files of independent journals devoted to the various phases of plant life. The library is specially rich in publications of foreign countries and has a growing collection of incunabula and other pre-Linnean works.

Bibliographical assistance is rendered to readers by members of the Library staff.

Laboratory Building

The Laboratory Building contains (besides offices of administration and the Library and Herbarium mentioned above) four laboratory rooms, a culture room, three classrooms with stereopticon and other equipment for instruction, a room for the installation of temporary exhibits, six private research rooms, and an auditorium seating about 570 and equipped with motion picture machine, stereopticon, and lecture table supplied with water, gas, and electric current for lectures involving experimental work.

Instructional Greenhouses

A range of three greenhouses, each about 20 x 30 feet, is provided for the practical instruction of children and adults in plant propagation and other subjects.

Children's Room

A gift of $1,500 in 1921 from Mrs. Helen Sherman Pratt, supplemented in 1923 by a further gift of $500 from Mr. George D. Pratt, has made it possible to provide a beautifully decorated room for the use of the Boys' and Girls' Club. Any boy or girl who is enrolled, or has been enrolled, in any of the children's classes at the Garden is eligible for membership in this club, which now numbers about 1,000 active members. The room contains shelves for a nature-study library, of which a nucleus has already been secured, and is equipped with stereoscopic views, photographs, and preserved and living specimens of plant life, for the instruction and entertainment of boys and girls. The room is open free to all children. Contributions of specimens and of books on nature study and closely related subjects will be most welcome.

Children's Building

This is located in the northern part of the Children's Garden plot and contains a conference room, and rooms for the storage of garden tools and implements. The furniture in the conference room was a gift from Mrs. James H. Post. Various collections of plants, seeds, and insects of economic importance in the garden are accessible here for consultation by the children. A garden library, a gift of friends, has been added. North of the Children's Building is a plot planted to ornamental shrubs and herbaceous perennials for the instruction of the children.

Children's Garden

A plot of about three-quarters of an acre in the southeast part of the Botanic Garden is devoted to the theoretical and practical instruction of children in gardening. The larger part of this area is laid out in garden plots which will accommodate about 200 children. At the south end is a Shakespeare Garden, given by Mrs. Henry W. Folger.

Non-Botanical Educational Features

Meridian Panel.—In 1931 there was placed in the paved walk in front of the main west entrance to the Laboratory Building a Terrestrial Position Panel, briefly referred to as the "Meridian Panel." This panel, of black Belgian marble terrazzo, is 21 feet, 2 inches long, and 5 feet wide. It contains a brass strip, 20 feet long and ⅞ inch wide, laid along the geographical meridian, the location of which was accurately determined by Mr. Weld Arnold, then of the School of Surveying of the American Geographical Society, but now of the School of Geography, Harvard University.

Another brass strip, 18½ feet long and ⅝ inch wide, marking the magnetic meridian, crosses the geographical meridian at an angle of 11° 11′. The data at the ends of the meridians are as follows:

At the North End:

Magnetic north. Variation 11° 11′ west in 1931
Annual increase 4′

At the South End:

Altitude above mean sea level, 115 feet

North latitude, 40° 40′ 06″
Longitude west of Greenwich, 73° 57′ 48″
To the North Pole, 3416.7 miles
To the Equator, 2798.2 miles

This feature is proving of much public interest, and the data are constantly being copied by classes and others.

Armillary Sphere.—The central feature of the Laboratory Plaza is the large Compass and Armillary Sphere erected in 1933. This was made possible through a bequest of the late Alfred W. Jenkins, a former member of the Botanic Garden Governing Committee. The Armillary Sphere consists of circular bands of bronze representing the principal celestial circles, and has been designed to serve also as a sun dial. Strictly, an armillary sphere should have either the earth or the sun represented in its center, but here, in order to make it serve as a sun dial, these are omitted, and a slender metal rod, extending from the south to the north pole of the sphere, serves as a gnomon. From the shadow thrown by this rod the correct sun time is indicated on a dial on the inner surface of the equatorial band. By means of the "Equation of Time" inside the sphere, this can be changed to Standard Time. The signs of the zodiac are to be seen on the outside of this broad band (as the band of the ecliptic where they are usually placed is too narrow to receive them): they were modelled by Miss Rhys Caparn, sculptor. Other circles represent the boundaries of the zones of the earth, and the north pole points to the North Celestial Pole. The sphere is mounted on a pedestal of Carver black granite from Vinal Haven, Maine. A bronze band encircling the pedestal bears the following classic sun dial motto:

"Serene I stand amyddst ye flowres
To tell ye passing of ye howres."

The pedestal rests on a platform of Stony Creek (Connecticut) pink granite, and the whole is mounted at the center of a large circular compass paved with marble terrazzo in four colors, each color representing a different point of the compass. The marble chips used in the terrazzo are of various origins, the red marble coming from Massa, Italy, the black from Mazy, Belgium, the green from Cardiff, Maryland, and the yellow from Siena, Italy.

Labelled Boulders.—The Brooklyn Botanic Garden is located near the western end of the terminal moraine of Long Island. This moraine was deposited at the southern edge of the continental glacier that occupied the northern part of North America, during the last Ice Age. The southward-moving ice picked up and carried along innumerable boulders derived from rock ledges in various localities north of what is now Long Island. During their journey, these boulders were rounded and polished and, in some cases, marked with striations that still persist. Twenty-eight of these boulders have had their lithological composition carefully determined and compared with that of rock ledges to the north. By this study it has been possible to determine, with a fair degree of accuracy, the approximate places from which the boulders now in the Botanic Garden were derived by the ice. Bronze tablets, given by Mr. Edward C. Blum, have been placed on these boulders, giving their composition, and stating that they were brought to the Garden by the ice-sheet during the glacial period.

A similar bronze tablet is mounted on a boulder at the foot of Boulder Hill (which takes its name from the large glacial erratic on its summit). The inscription reads, "Boulder Hill and the entire northern portion of the Botanic Garden are part of the terminal glacial moraine extending from The Narrows to Montauk Point. This tablet was given in 1932 by the Boys' and Girls' Club of the Brooklyn Botanic Garden."

Guide No. 7, *The story of our boulders,* has been prepared for the use of classes in geography or geology, or others who may be interested, and may be obtained at the Information Desk and Entrance Gates. Arrangements may be made in advance for docents to conduct classes who wish to study these labelled boulders.

INDEX TO VOLUME XXII

Accessions, 82, 90
  and Distribution, Herbarium, 100
  List of Some Important, 83
Aesthetics and Education, *22*
Alle alle, *29*
American Fern Society Collection, 88
  Iris Society, 42
  Journal of Botany, 142
  Rose Society, 42
Antevs, Ernst, 36, 130
Architecture, Notes on an "American Order" of, 177
Aristolochiaceae, 64
Armillary Sphere, 207
Arthur Hoyt Scott Horticultural Foundation, 42
Articles in Periodicals, 33
Association for Improving the Condition of the Poor, 45
Attendance at the Garden During 1932, 31, 67
Auxiliary, Woman's, 148

Balk, Robert, *37*
Barron, Leonard, 70
Battle, Kemp Plummer, 179
Benedict, Ralph C., 65, 109, 128
Bequest to the Brooklyn Botanic Garden, Forms of, Preceding p. 17
Berry, Edward W., 30, 36
Bloom, Twelve Months of, 28
Blum, Edward C., *37*
Blythedale Home, 42
Botanic Garden, Functions of a, 21
    Why Join the, 46
Botanic Gardens are also Employers, 19
Botany, Systematic, 64, 65
Boulder Hill, *37*
Boulders, Labelled, 208
Boys and Girls Club, *37*
Broadcasting, *32*
Brooklyn Botanic Garden Library, 171
  Bureau of Charities, 43, 44
  Home for Consumptives, 42
  Institute of Arts and Sciences, Department of Botany of the, 43
  State Hospital, 42
Brown, Glenn, 177
Buhle, Louis, 30
Bunt of Wheat, 56
Butler, Mrs. Glentworth R., 48, 49

Cactaceae, 64
Canal Zone Experiment Gardens, 42
Caparn, Harold A., 129
Caryophyllales, 64
Castanea crenata, 59
Ceracci's bust of Jefferson, 179
Chestnut, Japanese, 59
Chichester, Mrs. Emilie Perpall, 40, 89
Children's Building, 206
  Courses, 193
  Garden, 206
  Room, 205
Christmas Rose, 28
Churchill, Mrs. Mary Ellen Peck, 66
City, The Botanic Garden and the, Preceding p. 17
Classes and Courses, Adult, 68
  at the Garden, School, 182
Classwork, 75
Conferences, 182
Conklin, Mrs. Marie E., 66
Conservation of Native Plants, 109
Conservatories, *29*, 203
Contributions, 143
Cooperation, 41
  with Emergency Unemployment Relief Committee, 85
  with Relief Agencies, 44
Corn capital, 169
  Indian, 174
Courses, Children's, 193
Coker, Dr. W. C., 177

Davenport, Henry J., 48
Davis, Alexander J., 178, 179
Delectus Seminum, Brooklyn 1932, 1
Design, Little-Used Sources of Plant Forms for, 168
  Plant Forms in, 172
Dicotyledons, Classification of, 64
Director, Report of the, 17
Docentry, 35, 186

Doney, Charles F., 66
Dovekie, 29
Downs, Daniel C., 117
Drought, 28, 103

Ecology, 142
Education, Public, 33
Emergency Unemployment Relief Committee, Cooperation with the, 85
Endowment, 52
Erodium Manescavi, 28
Eugenics, Third International Congress of, 43
Exhibition of Plant Forms in Ornament, 167
Exhibits, 35, 48, 106
  The Nature of Our, 25
Experiments, Demonstration, 185

Field Trips Conducted, 144
Financial, 50, 110
Finnegan, Charles A., 66
Flower Days, 47, 70, 203
Forsythia, 92
Free, Montague, 70, 107, 129

Gager, C. Stuart, 52, 130, 177, 180
Garden Work, Outdoor, 77
Genetics, 65, 143
  Sixth International Congress of, 44
Gifts Received During 1932, 50, 119
Girls Club, Boys and, 37
Goodman, Bernard, 79
Grant, Forest, 176
Graves, Arthur Harmount, 57, 73, 130
Greenhouses, Instructional, 205
Grounds, Plantations and, 22
Guide Books, 36, 198
Gundersen, Alfred, 30, 64, 96, 130

Haddon, Joseph, 19
Helleborus niger, 28
Henry, William A., 39
Herbarium, 41, 204
  Accessions and Distribution, 100
  Phanerogamic, 99
Horticultural Society of New York, 42
  Library of the, 171
Horticulturist and Head Gardener for 1932, Report of the, 102

Indian corn, 177
Information, Circulars of, 196
  Bureau of Public, 33, 185
  Requests for, 106
Inspection, Eighteenth Annual Spring, 47
Instruction, Courses of, 33, 186
  for 1932, Report of the Curator of Elementary, 73
  Report of the Curator of Public, 67
Investigation, 195
  Independent, 196
Investigator (Ferns) for 1932, Report of the Resident, 108
Investigators Enrolled During 1932, Graduate Students and Independent, 66
Iris Plantations, 91
  Project, Beardless, 63
  Vartani, 28

Japanese Garden, 202
Jefferson, Ceracci's bust of, 179
  Papers, 180
Jenkins, Alfred W., 49
Jones, Owen, 172

Kaiser, Samuel, 66
Kimball, Fiske, 180

Labels and Signs, 95
Laboratory Building, 205
Lantern Slides, Loan Sets of, 185
Latrobe, Benjamin Henry, 169, 173, 177
Lawton, Elva, 66
Leaflets, 143
Lectures for High School Students, 70
Library, 40, 204
  for 1932, Report on the, 82
  Present Needs of the, 88
  Reference Work in the, 88
  Statistical Report on the, 90
  Use of the, 87
Litchfield Mansion, 174, 177
Little Auk in the Botanic Garden, 29
Lloyd, F. E., 65
Loans, Interlibrary, 87
Loan Material, Study and, 183
Local Flora Section, 27, 96, 105, 200
Lotus, East Indian, 42

Mansfield, Louise B., 47, 64
Map of the Garden, 199
Maps of Collections, 93
Materials, Distribution of, 74

Matsuki, Bunkio, 131
Mayor's Official Committee for the Relief of the Unemployed and Needy, 44
McKenny, Margaret, 48
Marcy, D. Elizabeth, 57
Members and the General Public, Courses for, 187
List of, 150
Membership, 46
Information Concerning, Preceding p. 17
Privileges of, Preceding p. 17
Summary of, 165
Meridian Panel, 206
Merrill, Elmer D., 43, 171
Merrill, Mrs. Whitney, 48
Monticello, 179

National Educational Association, 42
Needs, 81
Nelumbium speciosum, 42
Nephrolepis, 65
New Jersey Agricultural Experiment Station, 41
New York Association of Biology Teachers, 43
Botanical Garden, Library of the, 171
News Releases, 32
Nishida, N., 63
North Addition, 27
Carolina, University of, 174
Notes to Accompany the Seed List —1932, 14
Nurses, Classes for, 35

Officers of the Board of Trustees, 147
Ohio, Federated Garden Clubs of, 43
Orchids, Illustrations of, 47
Organizations at the Garden 1932, Meetings of, 144
Ornament, Exhibition of Plant Forms in, 167
Osman, Fred D., 70

Papaverales, 64
Parietales, 64
Parks, Increasing Public Appreciation of, 23
Pathology, Forest, 57
Plant, 53
Pennsylvania, School of Fine Arts, University of, 23
Perkins, Mrs. Charles E., 49
Personnel, Changes in, 49
Photographic Work, Report on, 146
Plantations, 199
and Grounds, 22
Plant, Flower, and Fruit Guild, 43
Plant Forms for Design, Little-Used Sources of, 168
in Design, 172
in Ornament, Exhibition of, 167
Planting, Ornamental, 105
Plants for 1932, Report of the Assistant Curator of, 96
Report of the Curator of, 91
Statistics Relating to Living, 95
Playmakers' Building, 177, 178
Plaza, 118
Laboratory, 103
Postcards, Souvenir, 199
Press Releases, 196
Primulales, 64
Private Funds Accounts, 112
Prospectus, 1933–34, 181
Publications by the Botanic Garden Personnel During 1932, 128
1932, Report on Brooklyn Botanic Garden, 142
Popular, 197
Public Relations, 30
Purdy, Maud H., 30, 65, 177

Ramsey, Carl T., 47
Record, Brooklyn Botanic Garden, 143
Reed, George M., 44, 53, 63, 70, 91, 108, 130
Report of the Brooklyn Botanic Garden, 1932, Twenty-Second Annual, 17
Reprints of Guide No. 6, 36
Research During 1932, 39, 53
Students, Registered, 40
Rock Garden, 201

School Service, 37, 68, 108
Schools, Talks at, 181
Schramm, Jacob R., 86
Science and Education, Importance of Adequate Support for, 18
Sea Dove, 29
Seed and Plant Distribution, 107
Distribution, 79
Exchange, 101
International, 29
List—1932, Notes to Accompany the, 14
Seeds for School and Home Planting, 182
Offered in Exchange, List of, 1
Shaw, Ellen Eddy, 42, 82, 131

Shrubs, Trees and, 92
Smuts, Cultural Characteristics of the Oat, 56
Physiologic Races of Oat, 55
Sorghum, 57
Sobel, Mollie, 66
Sorghum, Smuts of, 57
Specimens, Determination of, 185
Spiraea, 94
Stanton, T. R., 131
Statement for 1932, Financial, 110
Stoll, Frank, 146
Stork's Bills, 28
Students and Independent Investigators Enrolled During 1932, Graduate, 66
Registered Research, 40
Stutzer, Elise, 48
Succulent House, 30
Svenson, Henry K., 27, 65, 101, 133
Systematic Section, 96, 200

Tablets, Educational, 36
Talks, Extra-Mural, 35
Lectures, Addresses, and Papers Given by Members of Staff During 1932, 133
Tanaka, S., 63
Tax Budget Accounts, 110
Notes for Permanent Improvements, 118
Teachers, Courses for, 191
Tobacco capital, 173
Toedteberg, Miss Emma, 179
Torrey Botanical Club, 43
Transparencies, 30
Trees and Shrubs, 92
Trustees, Officers of the Board of, 147

Utter, L. Gordon, 56

Vollert, Hans E., 66

Wheat, Bunt of, 56
Woman's Auxiliary, 43, 48
Wood, George C., 43
Work and Relief Bureau, Emergency, 45

Yokohama Nursery Company, 63

Zea Mays, 174, 177

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GENERAL INFORMATION

Membership.—All persons who are interested in the objects and maintenance of the Brooklyn Botanic Garden are eligible to membership. Members enjoy special privileges. Annual Membership, $10 yearly; Sustaining Membership, $25 yearly; Life Membership, $500. Full information concerning membership may be had by addressing *The Director, Brooklyn Botanic Garden, 1000 Washington Avenue, Brooklyn, N. Y.* Telephone, Prospect 9-6173.

The Botanic Garden is open free to the public daily from 8 a.m. until dusk; on Sundays and Holidays it is open at 10 a.m.

Entrances.—On Flatbush Avenue, near Empire Boulevard and near Mt. Prospect Reservoir; on Washington Avenue, south of Eastern Parkway and near Empire Boulevard; on Eastern Parkway, west of the Museum Building.

The street entrance to the Laboratory Building is at 1000 Washington Avenue, opposite Crown Street.

To Assist Members and others in studying the collections the services of a docent may be obtained. This service is free of charge to *members of the Botanic Garden;* to others there is a charge of 50 cents per person. Arrangements must be made by application to the Curator of Public Instruction at least one day in advance. No parties of less than six adults will be conducted.

To Reach the Garden take Broadway (B.M.T.) Subway to Prospect Park Station; Interborough Subway to Eastern Parkway-Brooklyn Museum Station; Flatbush Avenue trolley to Empire Boulevard; Franklin Avenue, Lorimer Street, or Tompkins Avenue trolleys to Washington Avenue; St. John's Place trolley to Sterling Place and Washington Avenue; Union Street or Vanderbilt Avenue trolleys to Prospect Park Plaza and Union Street. By Automobile from points on Long Island take Eastern Parkway west and turn left at Washington Avenue; from Manhattan, take Manhattan Bridge, follow Flatbush Avenue Extension and Flatbush Avenue to Eastern Parkway, turn left following Parkway to Washington Avenue; then turn right.

BROOKLYN BOTANIC GARDEN
PUBLICATIONS

RECORD. Established, January, 1912. An administrative periodical issued quarterly (1912–1928); bimonthly (1929–1932); quarterly (1933–). Contains, among other things, the *Annual Report* of the director and heads of departments, special reports, announcements of courses of instruction, seed list, guides, miscellaneous papers, and notes concerning Garden progress and events. Free to members of the Garden. To others $1.00 a year. Circulates in 59 countries.

MEMOIRS. Established, July, 1918. Published irregularly. Circulates in 47 countries.

Volume I. *Dedication Papers:* comprising 33 scientific papers presented at the dedication of the laboratory building and plant houses, April 19–21, 1917. 521 pages. Price $3.50, plus postage.

Volume II. The vegetation of Long Island. Part I, The vegetation of Montauk: A study of grassland and forest. By Norman Taylor, June 11, 1923. 108 pages. Price $1.00, plus postage.

Volume III. Vegetation of Mount Desert Island, Maine, and its environment. By Barrington Moore and Norman Taylor, June 10, 1927. 151 pages. Price $1.60.

CONTRIBUTIONS. Established, April 1, 1911. Papers originally published in periodicals, reissued as "separates," without change of paging, and numbered consecutively. Twenty-five numbers constitute one volume. Price 25 cents each, $5.00 a volume. Circulates in 34 countries.

63. Inheritance of resistance to loose and covered smut in a hybrid of Early Gothland and Victor oats. 10 pages. 1932.

64. Inheritance of resistance to loose and covered smut in hybrids of Hull-less with Early Gothland and Monarch oats. 28 pages. 1932.

65. Monographic studies in the genus Eleocharis—II. 34 pages. 1932.

LEAFLETS. Established, April 10, 1913. Published weekly or biweekly during April, May, June, September, and October. The purpose of the *Leaflets* is primarily to give announcements concerning flowering and other plant activities to be seen in the Garden near the date of issue, and to give popular, elementary information about plant life for teachers and others. Free to members of the Garden. To others, fifty cents a series. Single numbers 5 cents each. Circulates in 28 countries.

GUIDES to the collections, buildings, and grounds. Price based upon cost of publication. Issued as numbers of the RECORD; see above.

Guide No. 5. The Rock Garden. 28 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 6. Japanese potted trees (Hachinoki). 11 illustrations. Price, 35 cents. By mail, 40 cents.

Guide No. 7. The story of our boulders: Glacial geology of the Brooklyn Botanic Garden. 22 illustrations. Price, 35 cents. By mail, 40 cents.

SEED LIST. (*Delectus Seminum*) Established, December, 1914. Since 1925 issued each year in the January number of the RECORD. Circulation includes 160 botanic gardens and institutions located in 40 countries.

AMERICAN JOURNAL OF BOTANY. Established, January, 1914. Published, in coöperation with the BOTANICAL SOCIETY OF AMERICA, monthly, except during August and September. Subscription, $7.00 a year. Circulates in 53 countries.

ECOLOGY. Established, January, 1920. Published quarterly in coöperation with the ECOLOGICAL SOCIETY OF AMERICA. Subscription, $4.00 a year. Circulates in 48 countries.

GENETICS. Established, January, 1916. Bimonthly. Subscription, $6.00 a year. Circulates in 37 countries.